the Petroleum Engineer

FOR MANAGEMENT

EQUIPMENT REFERENCE ISSUE

INTEGRATED EDITION OF THE PETROLEUM ENGINEER

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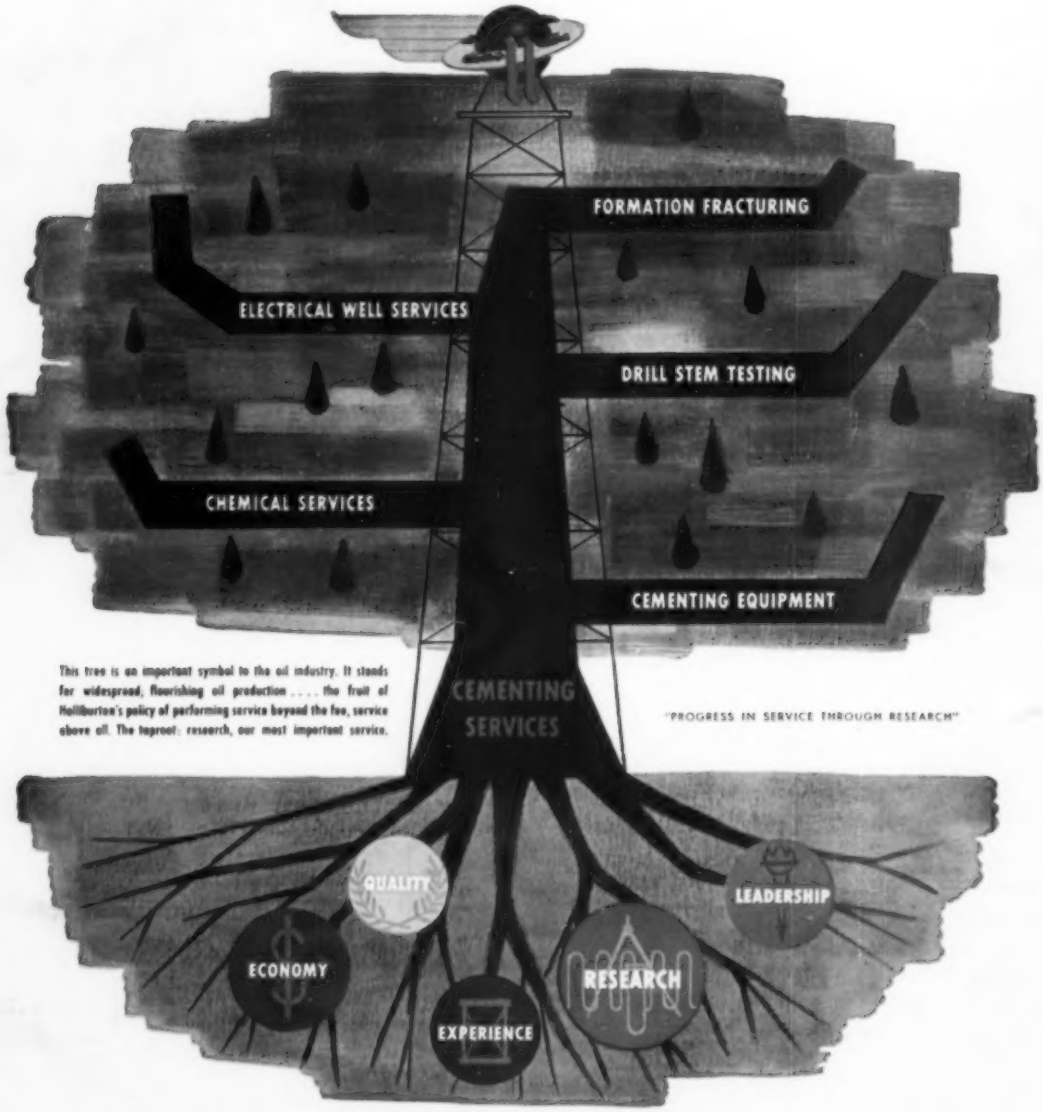
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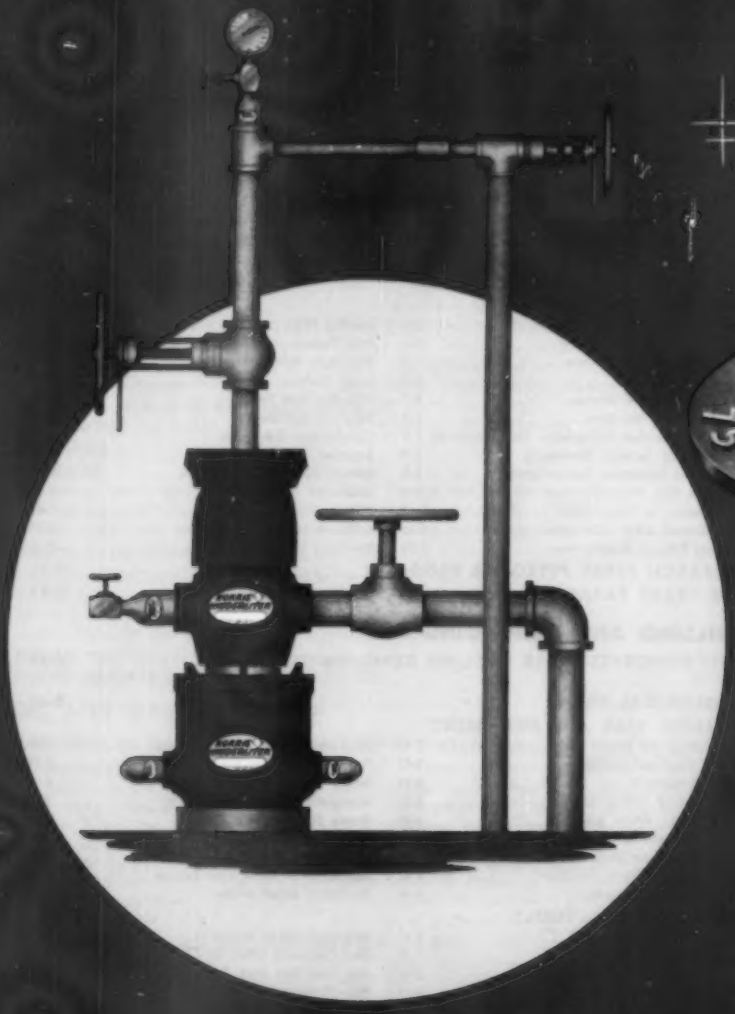

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New Equipment
New Products
New Services

Four Editions
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DON'T LOSE YOUR NEW IDEA

YOUR IDEA today could be an important step in progress. New concepts are a basic commodity if our petroleum industry is to continue to grow. In this special issue are presented many new improved equipment items. Each one represents an idea that has been developed, tested and introduced to the field.

Call it brainstorm, day dream or idea, all of us at one time or another conceives of a new device, tool or technique that might well cut costs or be a better way of doing something. What do we do with this new idea? Normally, we envision how it would work and what it would do. If it passes this phase, we mentally test it. Unfortunately 99 times out of a 100 it is lost in the myriad of day-to-day problems.

Even if YOUR IDEA survives this point it will probably die before becoming reality. The reasons are plentiful: The boss won't like it! They would think I was nuts! Why turn loose of this, I might patent it someday! Five years later YOUR IDEA might appear as a new tool but in the meantime the loss of your new concept is a tremendous waste of the 10 percent thinking power attributed to mankind. An equal loss or delay in the progress of your industry.

What to do with YOUR IDEA that is about to be lost? One, write it down, make sketches so that you can refer to it at some later date. Two, pass your idea on to someone in your company who can develop it further. If your company is not interested, present your good ideas to other men in the industry who might be able to apply them.

This has two great benefits. Exploited new concepts in tools, equipment and techniques leads to greater progress in our industry and a fuller way of life. The other is personal. As you give vent to your new concepts and ideas; broader, more important ones will take their place, ably guiding you toward leadership in your industry.

James A. LeVelle

*Congrats and $25.00 to
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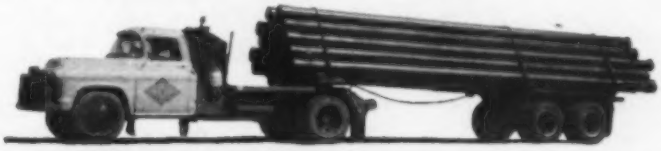

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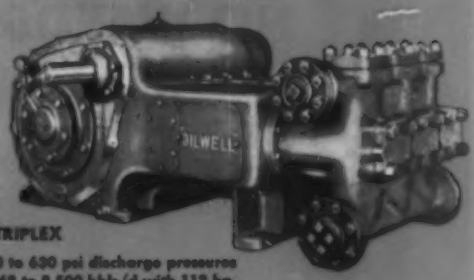
ACCESSIBILITY—Horizontal construction eliminates the dangerous use of step ladders in servicing operations.

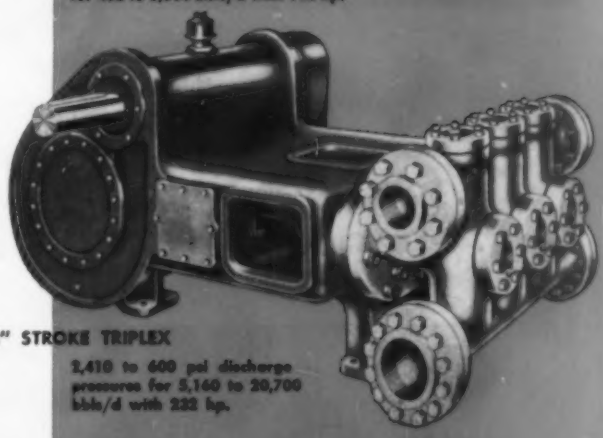
MAINTENANCE SAVINGS — Heavy-duty construction together with moderate operating speeds mean longer life for packing, plungers, valves and seats.

RELIABILITY — "Oilwell" pioneered the application of horizontal plunger pumps for waterflood services and has made more installations than any other pump builder. This application experience, backed by the operating records of the many users, is your best assurance of successful pump performance throughout the life of your waterflood.

4" STROKE TRIPLEX
3,000 to 400 psi discharge pressures for 860 to 6,850 bbls/d with 66.8 hp.



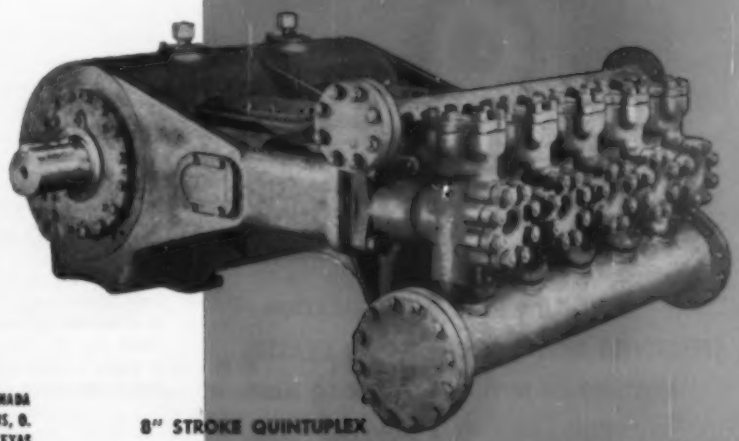
6" STROKE TRIPLEX
3,650 to 630 psi discharge pressures for 462 to 8,500 bbls/d with 112 hp.



8" STROKE TRIPLEX
2,410 to 600 psi discharge pressures for 5,160 to 20,700 bbls/d with 222 hp.

NOW . . . choice of four pump frame sizes

. . . representing the most complete line of horizontal power pumps in the industry . . . provides a wide range of plunger diameters to best suit your operating requirements with minimum input horsepower. A choice of material for fluid-ends, plungers and valve service is available.



8" STROKE QUINTUPLEX
3,340 to 1,270 psi discharge pressures for 7,340 to 20,400 bbls/d with 490 hp.

OIL WELL SUPPLY
DIVISION, UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
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Look

NO WEEDS!

UREABOR

WEED and GRASS KILLER

kills weeds—

prevents regrowth!

LOW RATE OF APPLICATION—
EFFECTIVELY DESTROYS WEEDS AND GRASSES
NOTHING TO MIX—NO WATER TO HAUL
NONCORROSIVE • NONFLAMMABLE

One application—DRY—may keep soil bare for 1 or 2 years!

Here's new UREABOR . . . a ready-to-use weed killing compound so powerful that only 1 to 2 lbs. can destroy most types of vegetation in an area of 100 square feet! And control continues effective for long periods because UREABOR *maintains its plant-destroying activity in root zones.* Such low application rates mean greater convenience . . . less storage space for material. You'll say it's great!

Because of its granular form, UREABOR weed killer is easily broadcast by hand for spot treatments. Larger areas are more efficiently treated by using a mechanical spreader. For most effective distribution of the small amount of material required, we created an inexpensive, handy spreader especially for UREABOR weed killer.

Special Spreader now available for fast, easy application . . .

The PCB Spreader applies UREABOR to best advantage, at prescribed low rates. It holds enough UREABOR to treat 1250 to 2500 sq. ft. without refilling—weighs a mere 6 lbs. Available now for just $10.75 delivered—anywhere in the U.S.A.

AGRICULTURAL SALES DEPARTMENT
United States Borax & Chemical Corporation
PACIFIC COAST BORAX COMPANY DIVISION
630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA

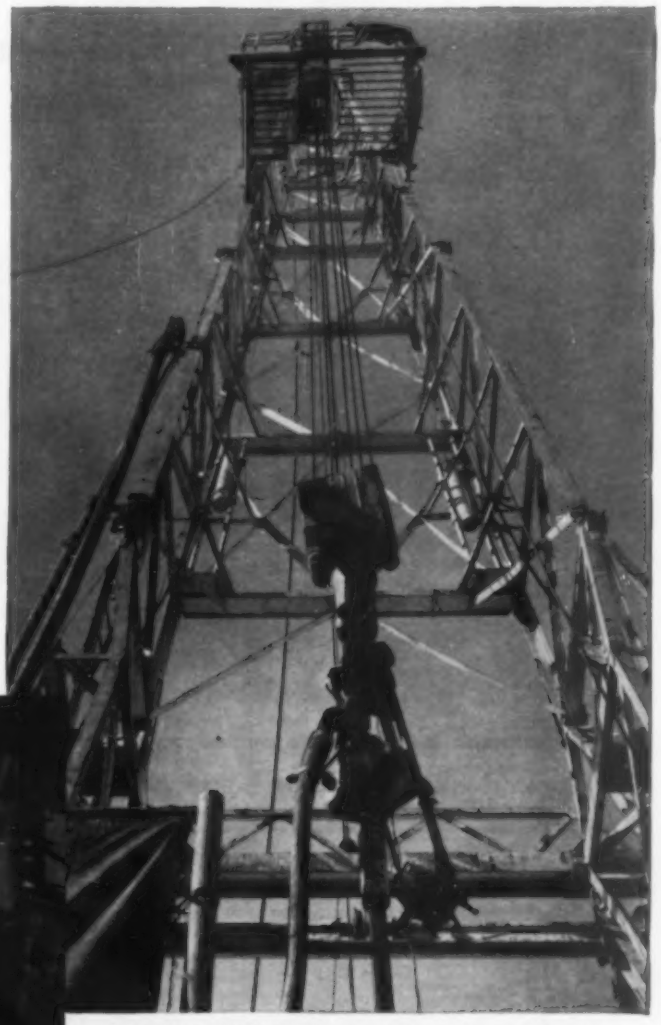
"We use American Tiger Brand Wire Rope in all our rigs—it gives the best service."

C. B. Leatherwood
Leatherwood Drilling Co.
Jacksboro, Texas

THE Leatherwood Drilling Company has been using Tiger Brand Wire Rope for more than three years on all their rigs. Before this, they tried a number of different ropes but found that Tiger Brand gave the best service.

Rig No. 1, shown here, is equipped with 1750 feet of 1⅛" Tiger Brand with independent wire rope core. They cut back 36½ feet after every 700 ton-miles and find that this practice gives long service life.

Leatherwood Drilling Company keeps accurate ton-mile records which they consider to be the best method for judging wire rope life. That's why they use American Tiger Brand on all their rigs. It means lower wire rope costs and less rig time wasted in changing ropes.



DRILLING A WILDCAT WELL near Jacksboro, Texas with 1750 feet of Tiger Brand Wire Rope.

C. B. LEATHERWOOD, PRESIDENT (right), and Johnny Houston, Driller on Leatherwood Rig No. 1. Wire rope is kept well-lubricated.

AMERICAN STEEL & WIRE DIVISION
United States Steel, General Offices: Cleveland, Ohio
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN TIGER BRAND WIRE ROPE

Excellay Preformed

USS

UNITED STATES STEEL

THE HAMMOND DIALIFT

the only membrane type conservation tank

...with full-rated vapor and product capacity at all times

...with a membrane that cannot come in contact with product

...with vapor space that can be isolated for inspection and maintenance without taking tank out of service.

Principle of the Hammond Dialift

A—DIALIFT DIAPHRAGM rises and falls to accommodate expanding and contracting vapor.

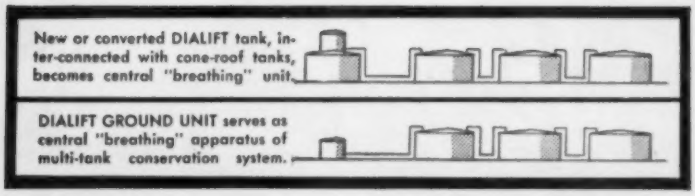
B—Vapor passes to and from tank and DIALIFT through simple elbow connection.

C—DIALIFT and tank have full-rated capacity.

D—Membrane can't come in contact with product.

E—DIALIFT can be isolated for maintenance and inspection, product tank stays in service.

The most efficient and economical vapor conservation system for new or old tanks.


New or converted DIALIFT tank, inter-connected with cone-roof tanks, becomes central "breathing" unit.
DIALIFT GROUND UNIT serves as central "breathing" apparatus of multi-tank conservation system.

THE HAMMOND DIALIFT consists of a gas-tight Vulcalock membrane attached to the inside periphery of a cylindrical metal housing to become a "breathing" apparatus to accommodate the expanding and contracting vapor as developed in product storage tanks. The DIALIFT can be used as a single conservation unit by being attached to the roof of a product storage tank or as a central "breathing" system by being manifolded to a number of product storage tanks. There are two forms of installation:—Ground type manifolded to a number of tanks to form a conservation system and integrated type whereby the DIALIFT is attached to the roof of a tank for vapor conservation for one or a number of tanks. The DIALIFT is completely isolated from the product storage tanks. Vapor passes between the tank and DIALIFT through a vaporline connection. It is easy to convert old cone roof tanks to efficient vapor-saving DIALIFT installations by attaching a DIALIFT housing with membrane to the roof of the old tank and connecting the vaporline between the tank and DIALIFT.

THE HAMMOND DIALIFT ELIMINATES BREATHING LOSS AND REDUCES FILLING LOSS

Write for dialift catalog 55DL

HAMMOND IRON WORKS

HAMONDTANK

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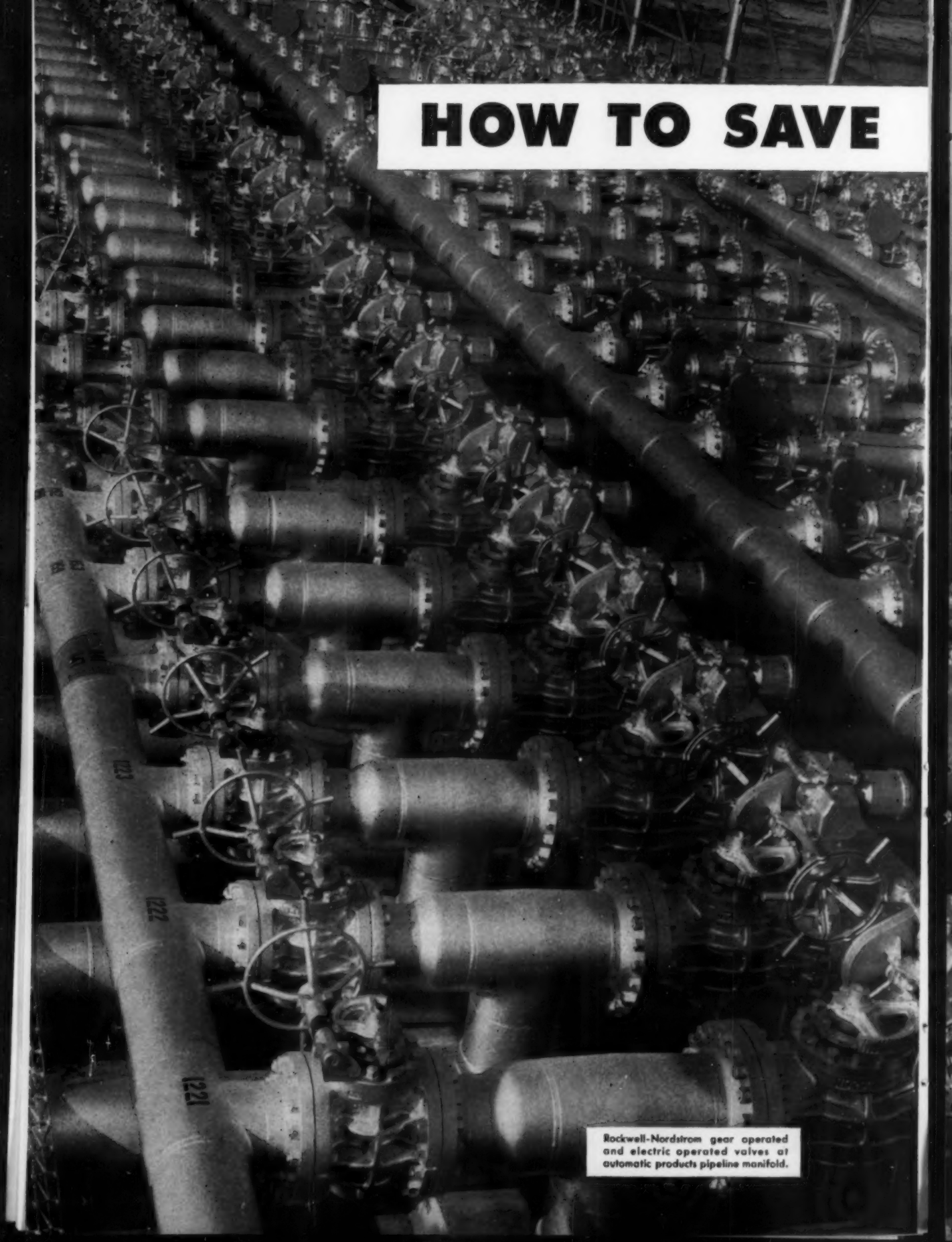
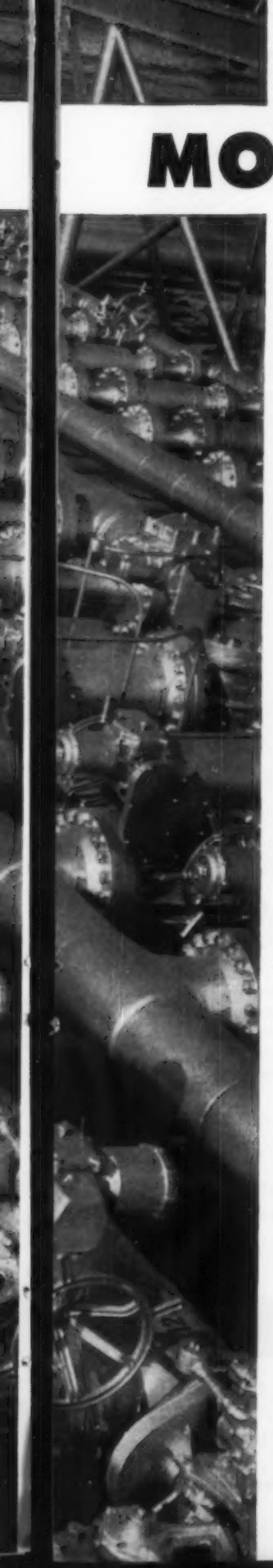


Rockwell-Nordstrom gear operated and electric operated valves at automatic products pipeline manifold.



MONEY ON MANIFOLDS

...and get better flow control

One lone valve that leaks or causes maintenance problems may not be too noticeable. But a pipeline manifold with *hundreds* of valves is a different matter. That's why you so often see huge manifolds (like the one at the left) 100% equipped with Rockwell-Nordstrom lubricated plug valves. Here's why they will save you money and assure better flow control year after year:

Lower Maintenance: Lubrication is preventive maintenance against repair and replacement . . . trouble doesn't have a chance to start. Also, the seats are *never* exposed to the line.

Longer Life: Lubrication prevents the grinding wear of metal-to-metal friction that ruins ordinary valves so quickly.

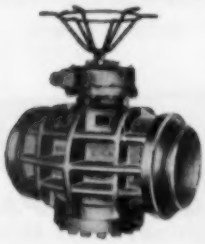
Positive Shut-Off: Costly product loss and contamination are eliminated because pressurized lubricant forms a tough, instantly replaceable seal that can't "wear out."

Compact Design: There are no bonnet cavities or rising stems. They can be manifolded much tighter . . . cuts investment in pipe, flanges, fittings, etc.

Rockwell-Nordstrom lubricated plug valves are available in a complete range of sizes and pressure ratings to meet your every pipeline need. They can be supplied with electric, hydraulic or pneumatic motor operators for automatic and remote operation. And they cost no more to buy—often less—than ordinary valves. See your supplier or write Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Valve Licensee:* Peacock Brothers Limited.

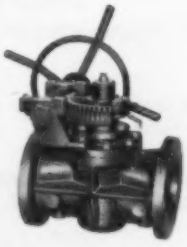
ROCKWELL-Nordstrom VALVES

Lubricant Sealed For Positive Shut-Off

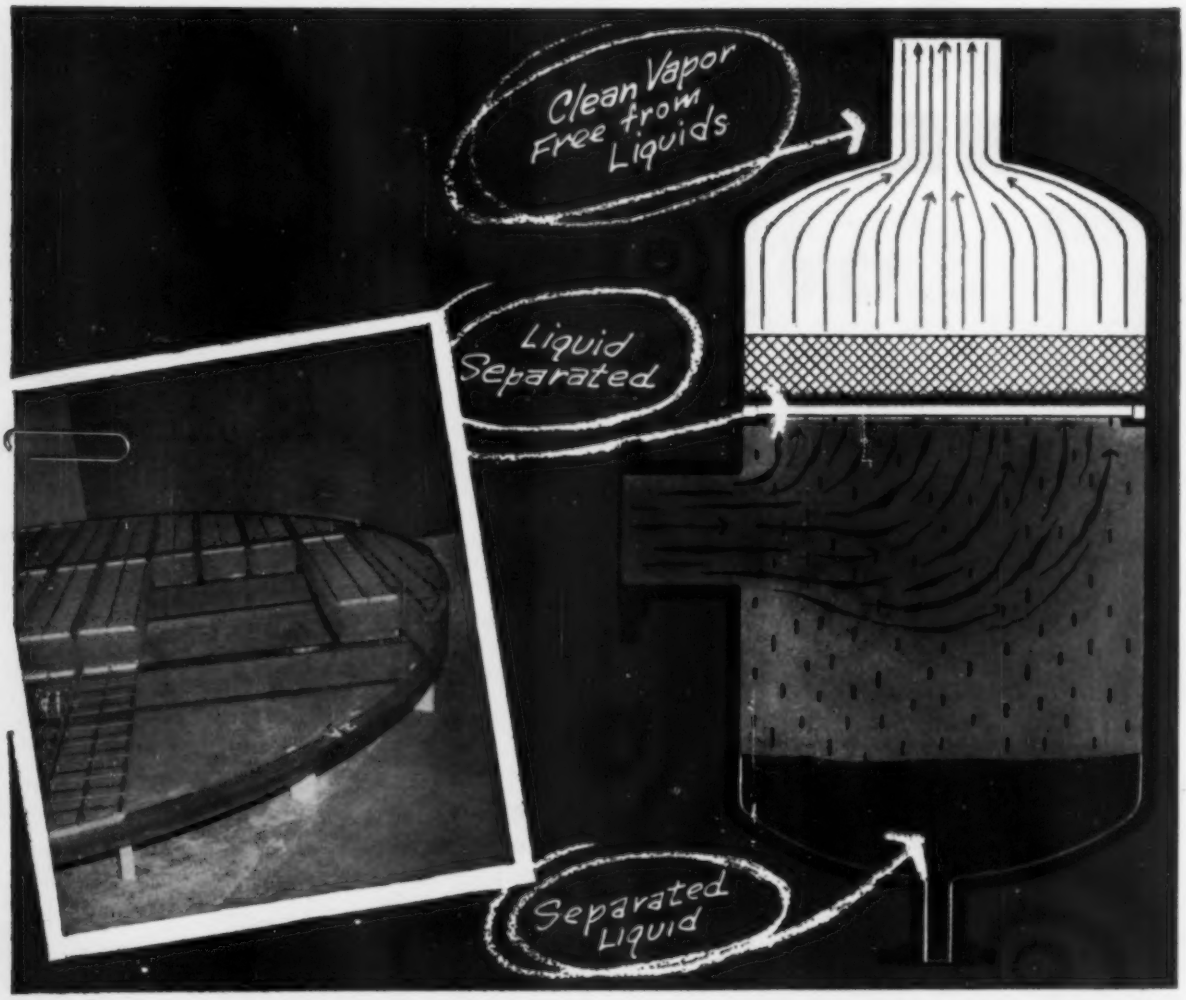


Rockwell-Nordstrom Hypreseal valves for pressures to 10,000-lb WOG and in sizes to 30" by 34".

Rockwell-Nordstrom Multiport 3-way valves for pressures to ASA 1,500-lb WOG and in sizes to 16".



Rockwell-Nordstrom Standard valves for pressures to ASA 600-lb and in sizes to 30".



How to IMPROVE Process Vessel PERFORMANCE

By effecting clean separation of liquid from vapor Yorkmesh Demisters improve process vessel performance.

In **distillation equipment** liquid entrainment is controlled, giving better quality overhead products even at increased thruput rates.

In refinery **vacuum towers,** higher quality gas oil means higher conversion rates to gasoline in the cat cracker.

In **absorbers,** loss of absorbing liquid is prevented.

In **separator vessels** and **knock-out drums** greater liquid recovery results.

In compressor **suction drums,** complete liquid separation decreases compressor maintenance.

In **evaporators,** by controlling liquid carry-over product loss is avoided, and high purity condensate is suitable for boiler feedwater or process use.

In **steam drums** the result is clean, dry steam.

In **vent stacks** Yorkmesh Demisters contribute to the solution of air pollution problems.

Write for Bulletin 17 and a complete list of the many case histories available from our technical library.

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Specialists in FLUIDS SEPARATION / ENGINEERS and MANUFACTURERS

EXTRA!

EXTRA!

"Leaky wells lose money"

Is this news? Of course not. Every producer knows the importance of having leak-proof tubing joints in his pumping wells.

YOUNGSTOWN knows it, too. That's why we pay particular attention to thread tolerances and joint make-up in the manufacture of all Youngstown Oil Country Tubing.

Youngstown Seamless Tubing—available in H-40, J-55 and N-80 grades—is produced with either non-upset or external upset ends. Youngstown quality-controls all its integrated operations from ore mine to finished product—which assures you long, trouble-free field performance.

When you need Tubular Engineering Service or additional information, contact your nearest Youngstown Sales Office. You will find our Field Engineers as near as your telephone. Why not call today?

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

He skipped the same 2 valves again today

Both are still in adjustment. Still no leaks, not even at the shank! Both are OIC plug valves. If he's curious enough to dismantle one, he'll see the OIC gland and O-ring construction that saves him time and cussing. It's different from other plug valves he's seen.

Three efficient seals prevent shank leakage on OIC plug valves. Concentric grooves machined into the gland liner form a "labyrinth" seal. The liner also retains an O-ring in contact with the plug's top face for a second positive seal. And resilient packing between gland and gland liner forms the third seal.

But the maintenance man measures design by *results*. OIC plug valves get his O. K. because they stay in adjustment a long time without leakage. However, if *you* are interested in the exclusive gland design and construction of these OIC plug valves, write for specification literature.

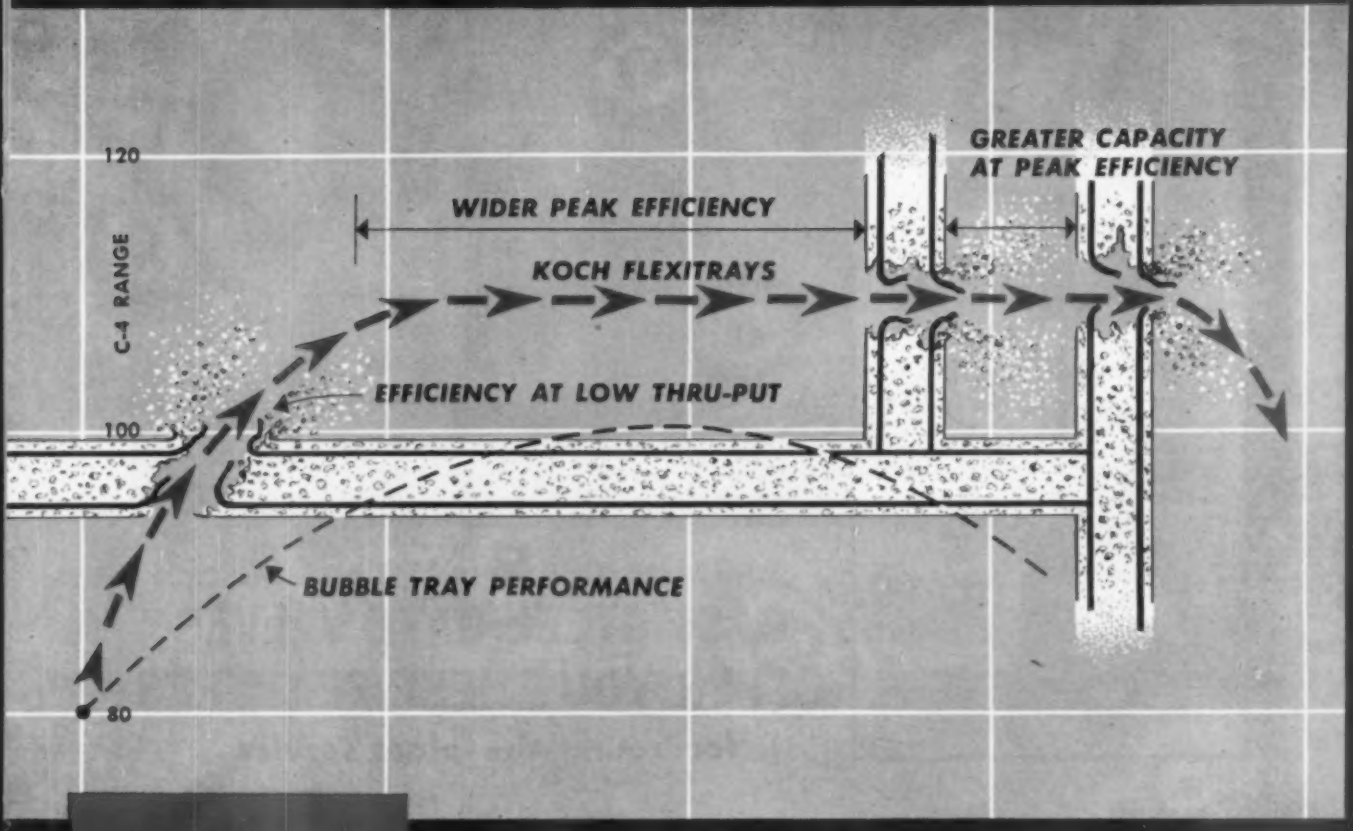
The Ohio Injector Company • Wadsworth, Ohio

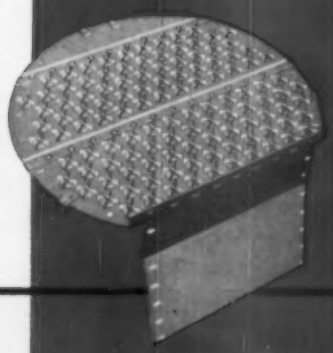
OIC VALVES

FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON VALVES

KOCH FLEXITRAYS

BREAK 3 BARRIERS





Investigate the accomplishments of this new low-cost tray in all services. Be among the leaders to use this fine new tray. More than 300 installations to date. Wire, write, or phone us on its application to your problems.

KOCH ENGINEERING COMPANY, INC.

DESIGNERS AND FABRICATORS OF MODERN TRAYS
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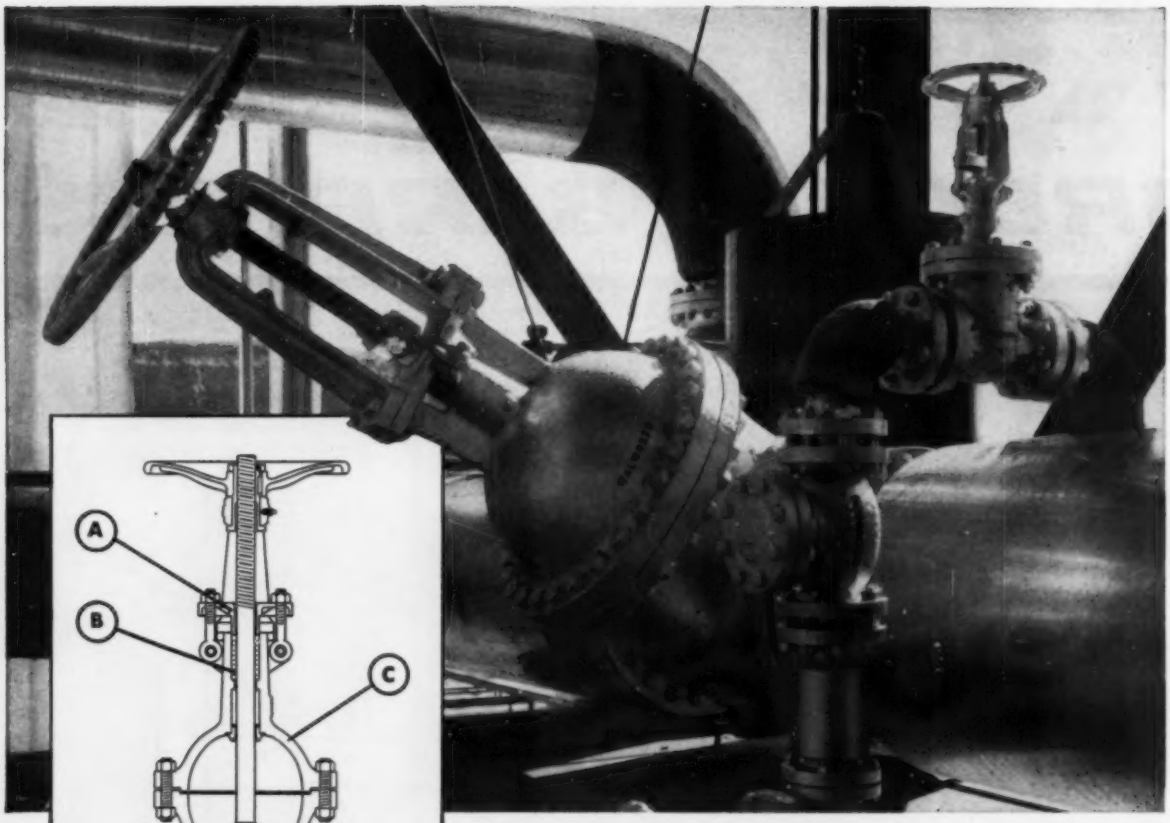
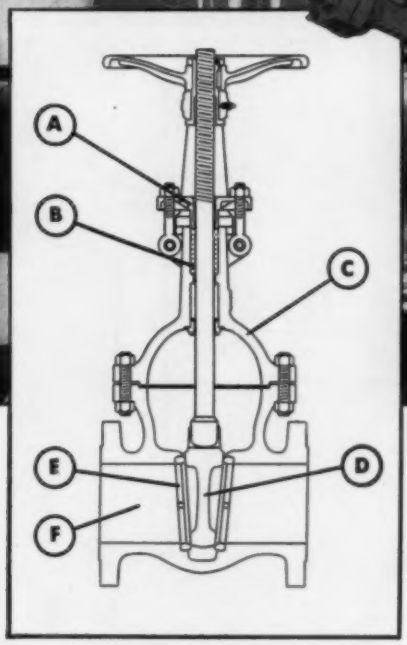
Tulsa, Oklahoma Representative: W. C. Myers Company, Wright Building
Houston, Texas Representative: Alpha Engineering Company, P. O. Box 12371
Pittsburgh, Pennsylvania Representative: D. D. Foster Company, 501 Alcoa Building
West Coast Representative: Jacobs Engineering Company, Pasadena: RYan 1-9373; Oakland: TEmplebar 2-5391
Illinois Representative: M. B. Fisher, 1521 Courtland Avenue, Park Ridge, Illinois





Walworth Series 150 and 300

CAST STEEL GATE VALVES OFFER YOU THESE FEATURES

for 'round-the-plant service

(A) GLANDS: Clearances between the gland and stuffing box, and gland and stem, are such that the stem cannot be scored even if the gland is pulled down unevenly.

(B) DEEP STUFFING BOXES: More than adequate in all sizes (2″ to 24″) to assure tightness and maximum packing life.

(C) BONNETS AND BODIES: Engineered to exceed the requirements of all applicable codes and standards. They are tough, durable, dependable.

(D) INTEGRAL GUIDE RIB FACES IN BODY: Machined to insure accurate centering of the gate.

(E) STURDY SEAT RINGS: Bottom-seated so that no recess exists at the back of the ring to cause turbulence, erosion and pressure drop.

(F) STREAMLINED PORTS: Permit unobstructed flow which results in minimum pressure drop and reduces the possibility of erosion.

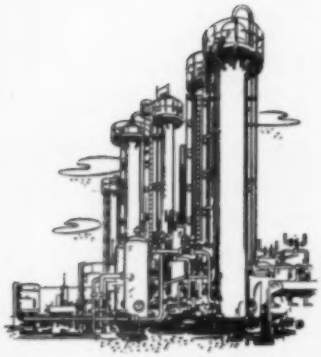
Walworth Cast Steel Gate Valves can be furnished with either flanged ends or butt welding ends. Roller bearing yokes are available on the larger sizes. On valves 4 inches and larger, by-passes can be furnished. Walworth Cast Steel Gate, Globe and Check Valves from Series 150 to 2500, are available. For Series 600 and higher, we recommend Walworth Pressure Seal Cast Steel Valves. See your Walworth Distributor or write to Walworth for complete information.

WALWORTH

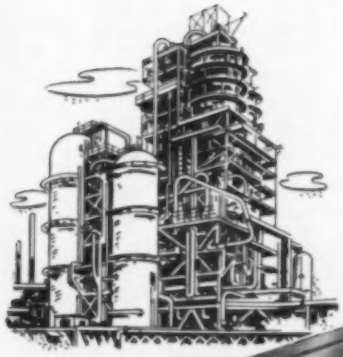
60 East 42nd Street, New York 17, New York

SUBSIDIARIES: ALLOY STEEL PRODUCTS CO. · CONOFLOW CORPORATION · M & H VALVE & FITTINGS CO. · SOUTHWEST FABRICATING & WELDING CO., INC. · WALWORTH COMPANY OF CANADA, LTD.

Wyatt's ... Facilities are Equal to whatever the Processing Industries require



• This record rail load for length, 192 feet, was Fabricated in Wyatt's Houston Plant for Oil Refining Service on the Gulf Coast

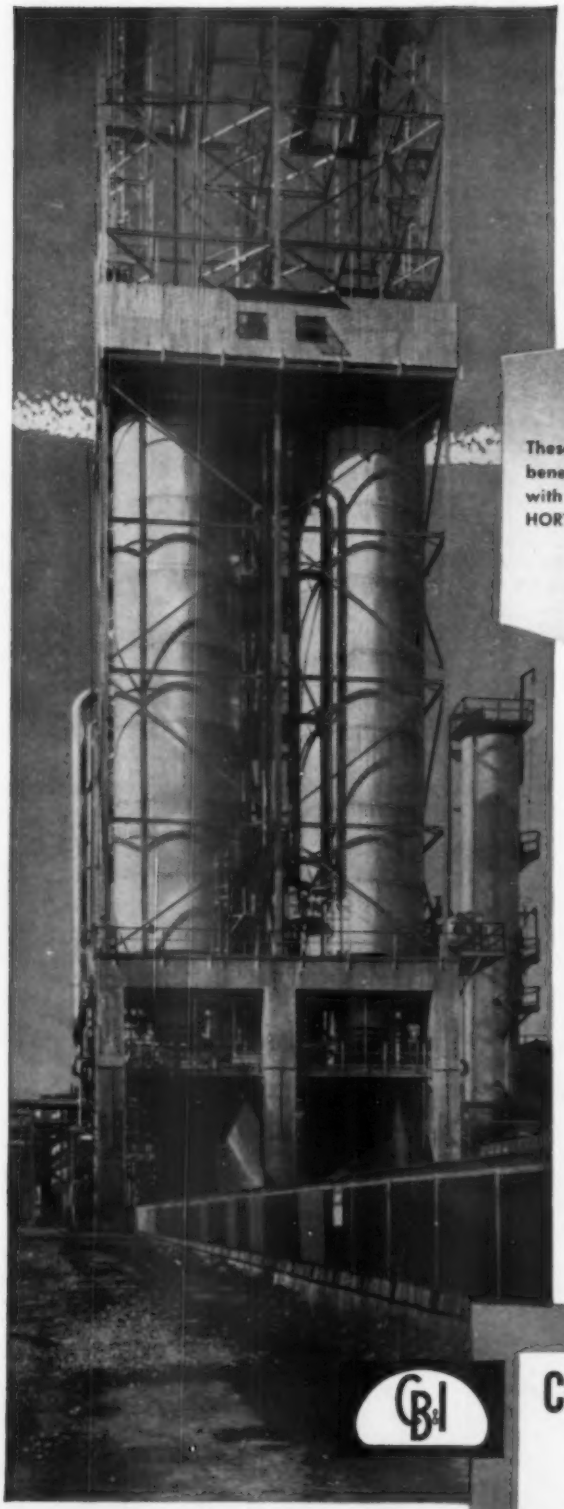


MANUFACTURERS AND ERECTORS SINCE 1913

PRESSURE DROP, LB. PER SQ. IN. PER MILE OF 6-IN. PIPE LINE (OIL OF 30° A.P.I.)

Quantity of 30° A.P.I. oil, bbl. per hr.	Viscosity of oil, Saybolt Universal seconds										
	100	110	120	130	140	150	160	180	200	220	240
200	7.20	7.42	7.62	7.79	7.96	8.12	8.27	8.57	8.83	9.07	9.29
205	7.53	7.74	7.95	8.14	8.31	8.48	8.63	8.94	9.22	9.47	9.70
210	7.84	8.06	8.28	8.48	8.66	8.83	8.99	9.30	9.59	9.86	10.10
215	8.17	8.40	8.62	8.83	9.02	9.20	9.37	9.69	10.00	10.27	10.52
220	8.51	8.75	8.97	9.19	9.39	9.58	9.76	10.09	10.40	10.69	10.95
225	8.85	9.10	9.32	9.56	9.76	9.96	10.15	10.48	10.82	11.12	11.39
230	9.19	9.45	9.69	9.93	10.15	10.34	10.54	10.89	11.23	11.55	11.83
235	9.54	9.81	10.07	10.31	10.54	10.74	10.94	11.31	11.65	11.98	12.28
240	9.90	10.19	10.45	10.69	10.93	11.15	11.35	11.73	12.09	12.43	12.73
245	10.27	10.56	10.84	11.08	11.33	11.55	11.77	12.16	12.53	12.89	13.20
250	10.62	10.93	11.22	11.46	11.72	11.95	12.18	12.59	12.96	13.33	13.65
255	11.00	11.32	11.62	11.87	12.13	12.37	12.60	13.03	13.41	13.79	14.13
260	11.38	11.71	12.02	12.28	12.55	12.79	13.03	13.48	13.87	14.26	14.61
265	11.77	12.10	12.43	12.70	12.97	13.23	13.47	13.93	14.34	14.73	15.11
270	12.15	12.51	12.83	13.12	13.40	13.67	13.92	14.39	14.81	15.21	15.61
275	12.54	12.92	13.26	13.55	13.83	14.11	14.37	14.86	15.30	15.70	16.12
280	12.94	13.33	13.68	13.99	14.28	14.56	14.83	15.33	15.78	16.20	16.62
285	13.35	13.75	14.10	14.44	14.73	15.02	15.30	15.82	16.28	16.70	17.13
290	13.75	14.16	14.53	14.88	15.18	15.46	15.75	16.29	16.76	17.19	17.64
295	14.16	14.59	14.97	15.32	15.64	15.92	16.22	16.78	17.27	17.71	18.16
300	14.58	15.01	15.41	15.77	16.11	16.40	16.71	17.27	17.78	18.24	18.69
305	15.01	15.45	15.86	16.24	16.58	16.89	17.21	17.77	18.30	18.79	19.24
310	15.43	15.89	16.33	16.70	17.06	17.38	17.69	18.29	18.83	19.32	19.79
315	15.88	16.33	16.79	17.18	17.55	17.87	18.20	18.80	19.36	19.86	20.35
320	16.32	16.78	17.25	17.65	18.03	18.37	18.70	19.33	19.91	20.42	20.91
325	16.76	17.24	17.71	18.12	18.51	18.87	19.20	19.84	20.43	20.98	21.48
330	17.20	17.71	18.19	18.61	19.02	19.37	19.71	20.38	20.98	21.53	22.06
335	17.67	18.18	18.67	19.10	19.52	19.90	20.24	20.92	21.54	22.11	22.64
340	18.13	18.66	19.14	19.61	20.02	20.42	20.78	21.46	22.10	22.69	23.22
345	18.60	19.15	19.64	20.12	20.53	20.95	21.32	22.02	22.67	23.27	23.82
350	19.07	19.63	20.15	20.64	21.06	21.49	21.86	22.57	23.24	23.86	24.43
355	19.56	20.13	20.65	21.14	21.59	22.02	22.42	23.13	23.82	24.46	25.04
360	20.04	20.62	21.16	21.66	22.13	22.57	22.97	23.71	24.40	25.06	25.66
365	20.51	21.11	21.66	22.18	22.65	23.09	23.53	24.26	24.97	25.65	26.28
370	21.00	21.61	22.18	22.69	23.20	23.64	24.09	24.85	25.58	26.27	26.90
375	21.49	22.11	22.70	23.22	23.75	24.21	24.67	25.44	26.19	26.89	27.53
380	21.98	22.62	23.23	23.76	24.30	24.77	25.25	26.04	26.81	27.52	28.19
385	22.48	23.16	23.76	24.31	24.86	25.37	25.83	26.65	27.42	28.15	28.83
390	23.00	23.68	24.29	24.88	25.42	25.94	26.42	27.25	28.05	28.79	29.49
395	23.52	24.22	24.82	25.43	25.99	26.52	27.01	27.87	28.68	29.45	30.14
400	24.04	24.73	25.37	25.99	26.54	27.09	27.59	28.49	29.30	30.06	30.80
405	24.57	25.28	25.94	26.55	27.11	27.67	28.18	29.11	29.94	30.72	31.48
410	25.11	25.84	26.51	27.14	27.69	28.29	28.79	29.76	30.59	31.39	32.16
415	25.65	26.39	27.09	27.70	28.26	28.88	29.42	30.39	31.24	32.06	32.85
420	26.20	26.93	27.64	28.30	28.87	29.50	30.03	31.03	31.89	32.73	33.55
425	26.72	27.50	28.22	28.89	29.49	30.10	30.67	31.66	32.55	33.41	34.22
430	27.27	28.07	28.81	29.50	30.11	30.71	31.29	32.33	33.24	34.10	34.92
435	27.83	28.64	29.40	30.08	30.73	31.35	31.94	32.98	33.91	34.78	35.63
440	28.37	29.20	29.98	30.67	31.33	31.94	32.54	33.64	34.59	35.45	36.32
445	28.93	29.79	30.55	31.29	31.97	32.56	33.20	34.29	35.29	36.18	37.03
450	29.50	30.37	31.15	31.91	32.60	33.20	33.86	34.95	36.00	36.91	37.78
455	30.06	30.96	31.76	32.53	33.24	33.85	34.50	35.64	36.69	37.64	38.50
460	30.64	31.55	32.37	33.16	33.88	34.51	35.17	36.34	37.41	38.35	39.23
465	31.21	32.18	32.98	33.79	34.53	35.17	35.81	37.04	38.13	39.10	40.00
470	31.79	32.78	33.60	34.42	35.18	35.84	36.49	37.74	38.86	39.81	40.77
475	32.37	33.38	34.22	35.06	35.83	36.50	37.17	38.45	39.56	40.57	41.51
480	32.94	33.97	34.82	35.68	36.47	37.15	37.84	39.14	40.27	41.30	42.23
485	33.56	34.61	35.49	36.33	37.13	37.83	38.53	39.86	41.02	42.07	43.01
490	34.15	35.22	36.15	36.97	37.80	38.55	39.22	40.58	41.72	42.83	43.80
495	34.75	35.84	36.79	37.66	38.46	39.23	39.92	41.31	42.48	43.61	44.59
500	35.34	36.50	37.46	38.32	39.14	39.92	40.68	42.04	43.23	44.38	45.39

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD



HORTONCLAD®

(manufactured by vacuum bonding process)

provides better corrosion protection in clad vessels

These benefits with HORTONCLAD® . . .
• UNIFORM THICKNESS
• HIGH STRENGTH BOND
• CLEAN, CONTAMINANT-FREE SURFACE
• ADAPTABILITY TO ANY SIZE OR SHAPE

Hortonclad, available only in CB&I tanks, pressure vessels and other clad structures, is unlike other clad materials. The bond is accomplished by a flux-free high strength vacuum bonding process producing a clad plate with an integral and continuous bond of exceptionally high strength. Uniform clad thickness results as both alloy cladding and backing are in their final thickness *before* bonding. Silver, stainless steels (both chromium and chromium nickel) nickel and high nickel alloys such as Monel, Inconel, and Hastelloys B and F can be employed in the Hortonclad process.

In corrosive service, Hortonclad permits the use of higher temperatures, concentration and pressures—without the high cost of solid alloy vessels. For further information on its application write our nearest office . . . ask for the *Hortonclad* bulletin.

405 STAINLESS STEEL HORTONCLAD was used in the fabrication of these two 16-ft. diam. by 65-ft. high coking chambers by CB&I.

P-52C

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland
SUBSIDIARIES:
Horton Steel Works Limited, Toronto; Chicago Bridge & Iron Company Ltd., Caracas; Chicago Bridge Limited, London; Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro.

WEIGHT OF DRILL PIPE AND CASING AND VOLUME OF FLUID DISPLACED

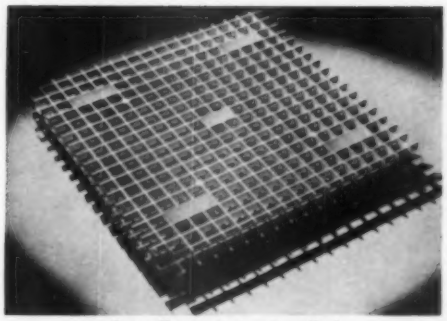
Diameter, in.	Weight, lb. per 100 ft.	Volume of fluid displaced per 100 ft., gal.	
		Lower end open	Lower end closed
Drillpipe			
2⅜	480	7.18	23.01
	665	10.16	
2⅞	645	9.86	33.72
	835	12.76	
	1,040	15.89	
3½	850	12.99	49.98
	1,120	17.12	
	1,330	20.32	
4½	1,275	19.48	82.62
	1,375	21.01	
	1,660	25.37	
5⅛	1,900	29.03	126.26
	2,220	33.92	
	2,525	38.58	
6⅝	2,220	33.92	179.07
	2,520	38.51	
	3,190	48.75	
Casing			
4¾	1,600	24.45	92.06
5	1,300	19.86	102.00
	1,500	22.92	
	1,800	27.51	
	2,100	32.09	
5½	1,400	21.39	123.42
	1,700	25.98	
	2,000	30.56	
5¾	1,400	21.39	134.90
	1,700	25.98	
	1,950	29.80	
	2,250	34.38	
6	2,000	30.56	146.89
6⅝	2,000	30.56	179.07
	2,200	33.62	
	2,400	36.67	
	2,600	39.73	
	2,800	42.79	
7	1,700	25.98	199.92
	2,000	30.56	
	2,200	33.62	
	2,400	36.67	
	2,600	39.73	
	2,800	42.79	
	3,000	45.84	
	4,300	65.71	
7⅝	2,640	40.34	237.21
	2,970	45.38	
	3,370	51.50	

Diameter, in.	Weight, lb. per 100 ft.	Volume of fluid displaced per 100 ft., gal.	
		Lower end open	Lower end closed
8	2,600	39.73	261.12
8⅝	2,800	42.79	303.51
	3,200	48.90	
	3,600	55.01	
	3,800	58.07	
	4,300	65.71	
9	3,400	51.96	330.48
	3,800	58.07	
	4,000	61.12	
	4,500	68.76	
9⅝	3,600	55.01	377.97
	3,800	58.07	
	4,000	61.12	
	4,200	64.18	
	4,350	66.47	
10	3,300	50.43	408.00
10¾	4,050	61.89	471.50
	4,550	69.53	
	5,100	77.93	
	5,550	84.81	
11¾	4,700	71.82	563.30
	5,400	82.52	
	6,000	91.68	
12	4,000	61.12	587.52
13	4,000	61.12	689.52
	4,500	68.76	
	5,000	76.40	
	5,400	82.52	
13⅜	4,800	73.35	729.87
	5,450	83.28	
	6,100	93.21	
	6,800	103.91	
14	5,000	76.40	799.68
16	5,500	84.04	1,044.48
	6,500	99.33	
	7,000	106.97	
	7,500	114.61	
	8,400	128.36	
18⅝	7,800	119.19	1,415.31
	8,750	133.71	
	9,650	147.46	
20	9,000	137.53	1,632.00
21½	9,250	141.35	1,885.98
	10,300	157.39	
	11,400	174.20	
24½	10,050	153.57	2,449.02
	11,300	172.67	

Source: *The Petroleum Engineer's* CONTINUOUS TABLES

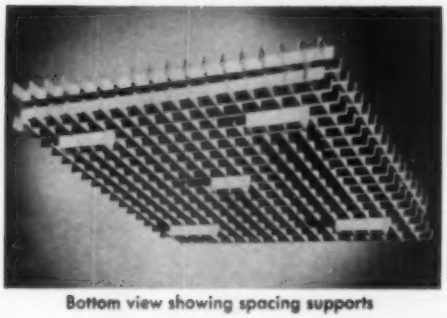
announcing

FLUOR'S NEW *poly-* GRID



Overall top view as installed

Side view of packing as installed



Bottom view showing spacing supports

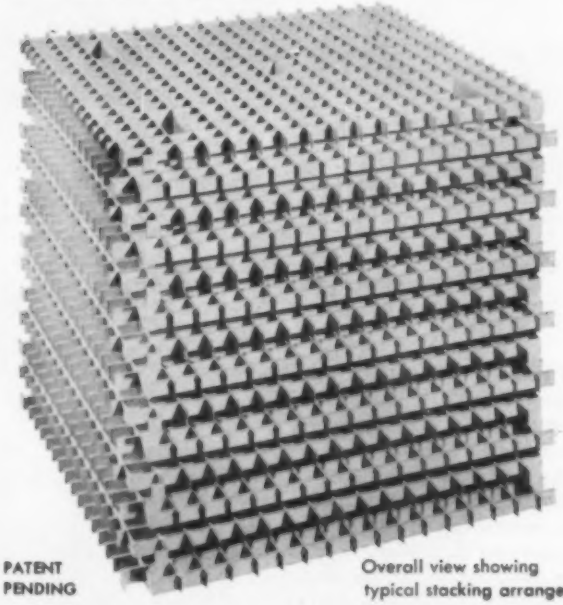
MORE COOLING IN YOUR EXISTING TOWER . . .

To increase the throughput of your existing counterflow induced draft cooling tower, Fluor Products Company now offers "Poly-Grid" packing.

This revolutionary packing provides greater cooling surface — greater overall heat transfer; yet construction is open, and pressure drop low.

"Poly-Grid" is available in high impact polystyrene or linear-polyethylene to meet all water conditions.

Fluor "Poly-Grid" packing allows you to cool more water under existing operating conditions, or to realize extra cooling of present throughput — all at minimum capital expenditure.



PATENT PENDING

Overall view showing typical stacking arrangement

Contact your nearest Fluor Representative for details.

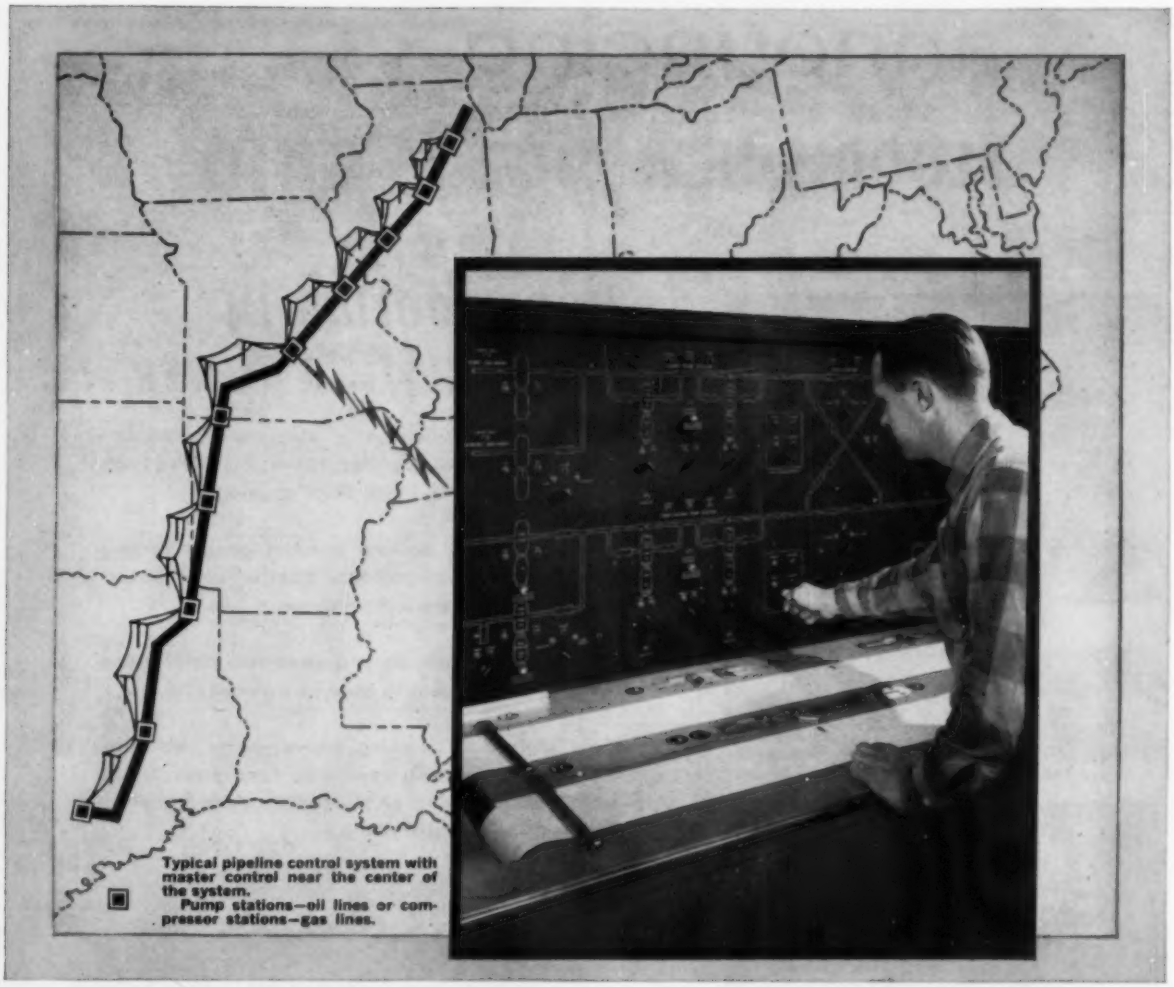
POLY-GRID can be easily installed in any counterflow induced draft cooling tower—regardless of make or model!

Call him today!

FLUOR PRODUCTS COMPANY

A DIVISION OF THE FLUOR CORPORATION, LTD.

GENERAL OFFICES • WHITTIER, CALIFORNIA


Typical pipeline control system with master control near the center of the system.
Pump stations—oil lines or compressor stations—gas lines.

UNION CTC means a complete Centralized Transport Control System

When you want a *complete* pipeline control system of any desired length, specify UNION CTC. Our engineering is based on the *systems design approach*, and Union Switch & Signal is prepared to take responsibility for integrating the entire control system. This includes communications, instrumentation, telemetering, and sequence control integrated into the one CTC system.

An operator located at a central dispatching office has all the information needed to control the flow of oil or gas throughout the system. He can function as if he were actually present at each station under his supervision. Control and indication codes can be transmitted over one pair of line wires or other channel in seconds.

UNION CTC provides more efficient dispatching and more effective control of through-put with considerable reduction in operating costs. It is *not* an expensive luxury . . . it is a profit earner.

If you are planning a new pipeline or modernizing an old one, Centralized Transport Control offers definite advantages. It can be used for gathering systems, tank farms and offshore applications. Write for our Bulletin No. 1052.

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
PITTSBURGH 18, PENNSYLVANIA

Quality First . . . TO LAST

VISCO
REG. U.S. PAT. OFF.
OIL TREATING
507
COMPOUND
55 U. S. GALLONS
VISCO PRODUCTS CO. Inc.
HOUSTON, TEXAS

Here's why Dowell M-38 (anti-swelling) ACID is called "the acid that will come back"

If the swelling of silicates, clays or bentonites has ever fouled up an acidizing treatment in your well, these graduated cylinders have an important story for you.

Both cylinders contained identical amounts of pulverized formation. The formation selected contained a high percentage of silicates and clays so swelling problems would be severe. Each sample received a small amount of crude oil to approximate the actual "in-place" oil saturation.

Then the cylinder at the right was filled with regular hydrochloric acid. The cylinder at the left was filled with Dowell M-38 acid. Both were thoroughly mixed.

After the acid had spent itself, the remaining formation was allowed to settle.

Notice how the formation in the regular acid has swollen — when compared with that in the M-38 acid. Notice, also, that less oil-in-water emulsion is formed when M-38 acid is used . . . two reasons why spent anti-swelling acid will come back faster.

What does this mean to you? It simply means that you can often get excellent production increases with anti-swelling acid in "dirty" formations that do not respond well to ordinary acid. In extreme cases, good results have been obtained in fields where ordinary acid had actually decreased production.

Anti-swelling addition agents are just a few of the more than forty materials Dowell Engineers can use to "tailor" acid to the requirements of your well.

For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write to Dowell Incorporated, Tulsa 1, Oklahoma.

Services for the oil industry DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

DYNAMIC MEASUREMENT In the Petroleum Industry

The petroleum industry has provided much of the motivating force for dynamic measurement progress. Originally used in seismic exploration, dynamic measurement is now indispensable in logging and automatic processing control

Joseph H. Lancor, Jr.

ALMOST everyone is familiar with instruments used for static measurement. But few people have ever seen dynamic measurement in the making. Dynamic measurement is usually used only in research or production. In the petroleum industry dynamic measurement is indispensable.

The reason why dynamic measurement is different is simply that when events begin to happen rapidly, the human being is incapable of interpreting them. In fact, he sometimes cannot even observe the event at all. So dynamic phenomena require special instruments which are capable of responding accurately and rapidly and which make special provision for recording the measurement in such a way that a human being can interpret the data at a speed of his own choosing.

The phrase "dynamic measurement," can apply equally well to three fundamentally different kinds of measurement. In the first type, the phenomenon to be measured is dynamic and we are attempting faithfully to record its adventures with time. In the second type, we have a number of independent phenomena which may be static, but we use dynamic measurement techniques to sample them all in a relatively short period of time, scanning them with a single instrument. In the third type, we have a single subject to measure but must sweep rapidly over a range of some property to determine the complex characteristics of the subject.

This article discusses principally dynamic measurement of the first type.

Dynamic measurement is a relatively new field of technology. Many of the roots of present-day dynamic instrumentation can be directly traced to seismographic techniques used in early geophysical exploration. It would be interesting to analyze to what extent the dynamic instrumentation industry is indebted to the petroleum industry for its origin. Consolidated Electrodynamics Corporation, for example, was formed in 1937 as a research and development organization in support of a geophysical activity.

A large percentage of the successful designers and practitioners in the field received their early training in petroleum and geophysical companies. The petroleum industry and the aircraft industry between them have provided substantially all the motivating forces which have established the dynamic instrumentation industry.

This technology, which had its beginning in the petroleum industry for a very specific purpose, now returns, much advanced and much broadened, to serve the industry in many new and important ways.

The Author

Joseph H. Lancor, Jr., has been with Consolidated Electrodynamics Corporation since December 1951, when he joined the firm as director of its Transducer Division. He became vice president in charge of engineering in November, 1953.

After graduating from MIT in 1935 (BSEE) he held several research and engineering positions, including that of research engineer for Sperry Gyroscope (1938 to 1947) and director of product engineering for Vitro Corporation of America (1947 to 1951).

In Drilling Operations

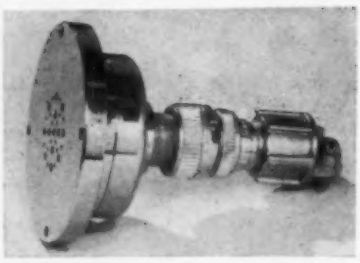
If we follow the sequence of operations in the petroleum industry, the next step beyond exploration is drilling and logging operations. Dynamic measurement is used here too. Through down-hole dynamic instrumentation the Petromechanics Division of Borg-Warner has studied drill development problems to depths of 10,000 ft.

The equipment is installed in the drill string between the bit and the drill collar in an instrument sub. It is pressure-tight and arranged to permit full flow of the mud. Just about all the physical phenomena measurable on the surface can be measured down-hole.

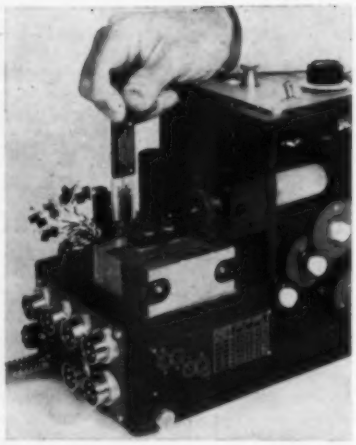
A few of the measurements petromechanics make are: Weight on the bit, outside mud pressure at the bit, hole mud pressure at the bit, temperature of the mud, vibration and chatter frequencies at the bit, stresses near the bit, acceleration of the bit, velocity of the bit, displacement of the bit, and revolutions per minute. The actuating mechanism of the whole instrument is controlled by a surge of the mud pressure from the surface.

Several other firms are working on similar down-hole instrumentation for solving a variety of problems. This type of instrumentation will proceed rapidly simply because of the traditional aggressiveness of petroleum people in opening up new methods. Add to this the demonstrated eagerness of instrumentation people to broaden usage of their wares and the economic stature

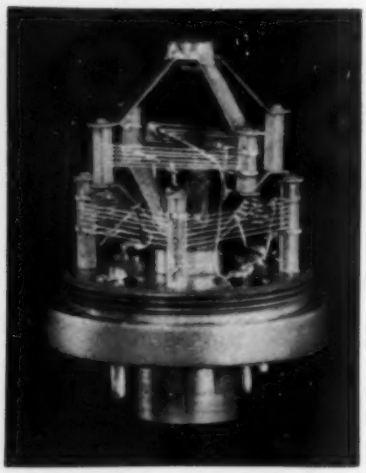
Dynamic pressure pickup in which an infinitesimal amount of polar liquid flowing through a porous disk generates an electrical signal. It has calibration stability, low internal impedance, and amazingly high output. The pickup is shown with a Cannon plug.



A six-channel recording oscillograph with cover removed showing how galvanometers are lifted out of the magnet block.



A pressure pickup with its cover removed to show the "birdcage" construction which transforms mechanical force (pressure) into electrical analog signals. The circular base of this pickup is about the size of a U. S. quarter.



and significance of petroleum products, and you will agree that progress here is inevitable.

In Pumping and Piping

Once we have the product coming out of the ground, we have an array of problems associated with pumping and piping. Pressure-surge problems and associated mechanical vibration and strain effects are quite routinely investigated, using dynamic measurement equipment.

The Fluor Corporation has for the past few years maintained a mobile laboratory equipped for dynamic instrumentation of this type. The first unit was established in a converted house trailer. It logged over 100,000 miles over the country before it was retired. Fluor now has a new, 10-ton diesel semi-truck and trailer with the latest in dynamic equipment. This unit is most frequently found at refineries and gas transmission compression stations.

Typical of the problems on which the mobile laboratory works are pulsating pipeline transmission sytems which are causing pipe breakage and equipment failure. In this kind of problem, they simultaneously record the vibratory accelerations and displacements of various parts of the system together with various pressures, such as the inlet and exit pressures of pulsation dampeners.

With data thus acquired they can, by comparison of amplitude, phase and frequency of the traces, identify the source of vibration or evaluate the effectiveness of pulsation dampeners. Armed with such information, the best solution to the problem can be determined on a quantitative basis.

In Production

Good examples of the other two types of dynamic measurement can be found in petroleum production. One major use of the second type is in refinery logging. Several major oil companies are now using digital indicating equipment to read out as many as 100 measurement points.

Such equipment, known to us as SADIC instrumentation, automatically and sequentially scans the 100 pickups and prints the readings on a typewriter to an accuracy of 0.1 percent. It will complete a measurement cycle in a period of 30 to 100 sec, depending upon requirements. Other equipment of this type is available which can sample at the rate of 1000 points per sec.

In Processing

The third type of dynamic measurement is used in processing, where mass spectrometers are employed to continuously monitor the stream, periodically scanning the mass range to determine quantitatively the stream constituents.

The "tools" used in dynamic instrumentation are relatively simple. The process begins with the pickup—known technically as transducers.

Equipment

Some astonishing strides have been made in the last few years in the development of pickups of high accuracy for almost any conceivable physical measurement. One publication lists several hundred distinct types made by over a hundred manufacturers.

Transducers operate on a wide variety of physical principles but, in general, the tendency is to choose the most stable and fundamental principles to achieve functional reliability and simplicity. After all, the transducer is limited by the same physical laws as the subject to be measured and, if we are to use them with confidence, they must be basically more dependable than the subject of the measurement. Some of the more commonly used types of transducers are:

Externally Excited	*Self-Generating*
Strain-sensitive resistance	Electronic
	Electromagnetic
Potentiometer	Thermoelectric
Variable reluctance	Piezoelectric
Variable capacitance	Electrokinetic
Differential transformer	Radioactive
	Photoelectric

The output of the transducer is fed to what we call signal conditioning apparatus. This apparatus can take a wide variety of forms, ranging from a simple resistor network to three or four racks of electronic equipment. Some of the more important units are: Wheatstone bridge networks, commutators, attenuators, linear a-c amplifiers, integrating and differentiating amplifiers, carrier amplifiers, direct current amplifiers, analog-to-digital converters, and telemetering systems. Most of these devices are basically no more complicated than an average table-model radio. But they are built better and are more reliable.

To complete the dynamic measure-

HOW THE MASS SPECTROMETER WORKS

a. A sample of the unknown substance is stored in a small container at relatively low pressures, usually in the vapor phase.

b. The molecules are introduced through a series of special valves called the inlet system.

c. The conglomerate mixture of molecules passes through a restriction called a gold leak. The tiny openings allow only a limited number of molecules to pass.

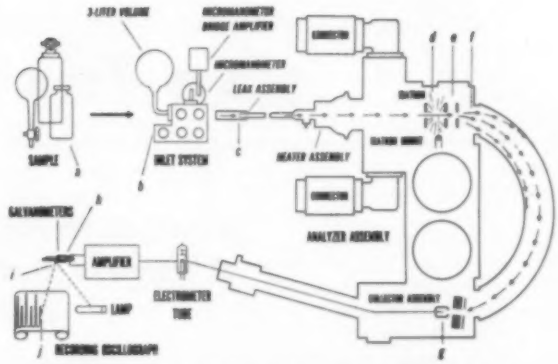
d. In the ionization chamber, called the Isotron, a much higher vacuum is maintained. Here the molecules are bombarded with a stream of electrons from a heated filament. Some become positively charged ions, others are fragmented and positively charged.

e. Ions thus formed leave the Isotron chamber through a narrow slit. They are next accelerated to a high velocity by a strong electrostatic field, and pass through a second slit.

f. A magnetic field, parallel to the slits, diverts the fast-moving ions into circular paths, the radius of which is proportional to the mass and velocity of the ion. Thus, the single beam is split into individual beams.

g. Sorted in this manner, ions of given mass pass through resolving slits and strike a collector 180° away from their starting point. The charges given up to the collector are amplified by an electrometer tube.

h. Having now been translated into an electric signal, the results



are amplified and fed to a bank of five galvanometers, each set for a different sensitivity.

i. A tiny beam of light reflected from each galvanometer mirror is photographed on a moving roll of sensitive paper in the oscillograph.

j. Thus, the complete mass spectrum is obtained, focusing the separated ion beams successively on the collector by varying the ion-accelerating voltage. As each beam sweeps across the collector, its intensity is recorded on the moving paper.

ment system, we need an indicator or a recorder to present the dynamic measurement to the human observer in a form he can absorb. Some of the important devices in this area are: Strip-chart or direct-writing recorders, photographic oscillographs, cathode-ray oscilloscopes (sometimes used with a camera for permanent recording), and magnetic-tape recorders.

Various combinations of these devices make available to us a staggering number of different dynamic instrumentation systems capable of handling almost any conceivable measurement problem.

Techniques

Automation and automatic process control is another example of dynamic measurement in the petroleum industry. The petroleum industry has become a special target for the proponents of this technology for these good reasons: The industry's products are in fluid form, the processes are on a continuous-flow basis, and the economics of the industry justify this kind of equipment.

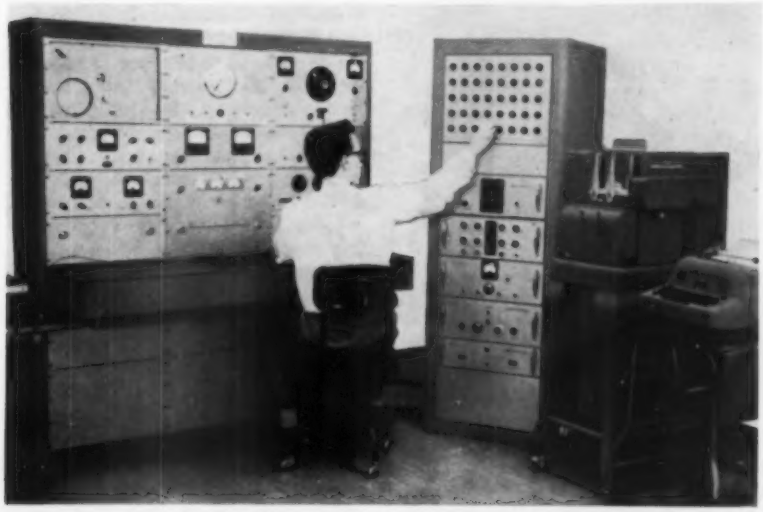
The current enthusiasm and optimism for automatic control is based on the fact that we now have the tools for the job. But we do not yet know well enough how to use them in the petroleum industry.

In the past two or three years, at least 20 technical papers have been presented which advanced theoretical solutions to the typical process control problem. All of these treated the problem in the terms and concepts of the electronic servomechanism man. Some used the frequency response presentation and others used the step-function response concept. Most arrived at a mathematical expression called a transfer function for a refinery or chemical process.

Most of the papers offered a theoretically sound approach, but it is going to be a difficult task to get this kind of theoretical approach reconciled with the vast body of practical knowledge gathered over the years by those who have specialized in petroleum processing.

Process automation will come as electronic instrumentation engineers are given the opportunity to learn the language and technology of the petroleum industry. This may be later than we say, but earlier than you may think.

* * *

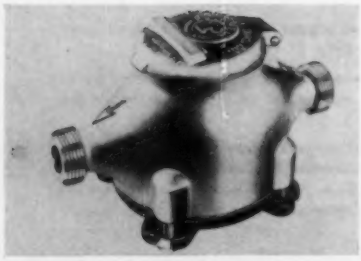


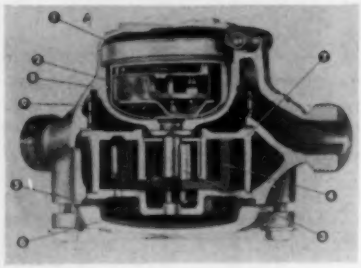
Designed to save time in the data reduction and computation encountered in routine analytical work, the Spectro-SADIC receives data directly from the mass spectrometer and converts it into digital form for automatic tabulation by an electric typewriter or an IBM 517 punch. Spectro-SADIC is in center, mass spectrometer at left, readout equipment at right.

MODERN . . .

industry equipment

Manufacturers report product, tool and service news of interest to all phases of the petroleum industry.





Registered Water Meter Sealed

370 A new type of water meter, utilizing magnetic force to transmit motion from the measuring chamber to a hermetically sealed register, is announced by Rockwell Manufacturing Company. Meter differs radically in design and construction from existing devices.

In contrast to conventional water meters, the Rockwell Sealed Register Meter contains no stuffing box or separate intermediate gear train. Unit contains 15 stock parts, of which only 2 moving parts operate in contact with water. Replacing the separate gear train and stuffing box in the new meter are 2 permanent magnets. One magnet is contained in the oscillating piston in the measuring chamber; the other travels in a well in the sealed register. The force between them effectively transmits motion from measuring chamber to register.

By eliminating both stuffing box and the intermediate gear train, the sealed register meter gains both in accuracy and efficiency, engineers said. The magnetic transmission is inherently frictionless.

Lack of friction permits use of instrument-type gears in the register. Because the small gears use only a small portion of the force supplied by the magnets, the register responds quickly and accurately to piston movement.

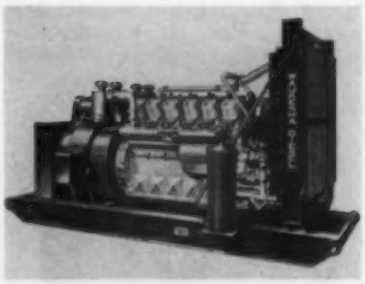
Meter is an oscillating piston meter containing 4 principal parts: Main casing, measuring chamber, sealed register and bottom plate. As in conventional oscillating piston meters, the measuring element is a balanced hard rubber piston which oscillates within a circular measuring chamber, displacing a known amount of liquid with each oscillation.

Because the register is a tamper-proof, hermetically sealed unit, company policy will be to replace any register which fails within 5 years at no charge. Actually, he said, register tests under the most severe conditions of use have indicated almost limitless durability.

Present register and straight reading, calibrated in cubic feet or gallons, and use a center sweephand. Future registers will be both straight and circular reading.

Sealed register water meters now in the field are ⅝ and ⅝ by ¾ in. in size. Future sizes to 1 in. are planned, and the company says the magnetic drive principle will eventually be used in meters larger than 1 in. in size, as well as to other types of meters.

Rockwell Manufacturing Co.



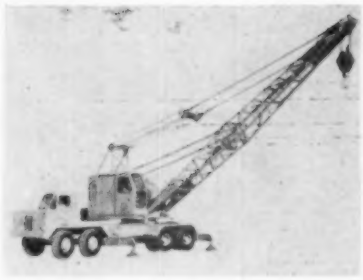
Enginator Has 800 kw Capacity

371 Waukesha Motor Company's most powerful engine-generator package is the turbo-supercharged diesel-driven Model VLRDBSU Enginator, developing up to 800 kw at 1200 rpm for standby service and having a continuous duty rating of 675 kw. Engine is a V-12 type, 8½ by 8½-in. bore and stroke, and with a piston displacement of 5788 cu in. Maximum horsepower is 1190 at 1200 rpm when equipped with radiator and fan cooling. In addition to the turbocharged engine, a normally aspirated diesel and a gas fuel version are also in production in this V-12 series. Rotating field single bearing alternator is directly connected to the engine through a flexible drive coupling. It is furnished with electrical characteristics of phase, voltage, frequency, or current to suit the application requirements.

Waukesha Enginators are a development of a half-century of manufacturing experience in the field of heavy-duty internal combustion engines and electrical equipment. The large range of Waukesha power units available permits accurately balanced engine and generator combinations in applications requiring power for continuous, intermittent and stand-by duty.

The complete line ranges from the 135-series, with a 425 cu in. engine and a maximum of 85 kw, up to the VLR series illustrated. All sizes are available in normal or turbocharged diesel versions or for use with carburetor fuels.

Waukesha Motor Company



Light Crane Handles 45 Tons

372 Production on a new 45 ton capacity truck crane has been started by Koehring Company. Total weight for the unit is only 90,080 lb. For critical moving conditions, this can be reduced to 67,100 lb by removal of boom, counterweight and outrigger beams.

Designated as the Koehring 445, the new truck crane can use up to a 120 ft boom. Straight boom jibs 15, 20, 25 and 30 ft long with cable are available for special high lift crane service. Safety boom limit stops and power boom lowering are standard equipment.

Powered by a Waukesha 145GKB engine that delivers 214 hp at 2400 rpm, the truck has 8 speeds forward — 4 in main and 2 in auxiliary. Top speed is 31.8 mph.

Truck chassis, mounted on a 220-in. wheel base, is 10 ft 1 in. wide and 30-ft 2½ in. long. Two outrigger housings are furnished for extra stability.

Newest addition to line of excavators is the crawler-mounted model 805 that can be used as a crane, 2 to 3 cu yd dragline, up to a 3½ cu yd clamshell or a 2 cu yd shovel.

Equipped with friction type steering brakes that are spring set and air power released, it is possible for the 805 to turn within its own length when one crawler is completely locked. Main clutches have a mechanical power booster, cam action and automatic adjustment for heat expansion; permit operator to feel load being handled.

Bucket on the 805 shovel is crowded into cut by a heavy roller chain. A high A-frame, power raised or lowered, is standard equipment on all cranes using 75 ft booms or longer.

Koehring Company

Portable Power

373 Homelite carryable pumps are designed and constructed specifically to meet the varied requirements of the oil industry. Fast and completely automatic self-priming keeps seepage down to strainer level: Gets excavations dry quickly and keeps them dry. Though small in size, Homelite pumps are big in performance. They handle mud and sand easily. Powered by Homelite air-cooled, 2-cycle engines, capacities range from 5500 to 15,000 gal per hr.

Homelite carryable generators can be carried easily right to the spot where portable power is needed to operate electric saws, drills, grinders, hammers, lights, and other electric equipment in emergencies or on regular operations. These ruggedly-constructed generators are specifically designed for continuous duty in the toughest kind of service. Instantaneous engine governor action gives close voltage and frequency regulation from no load to full load. Capacities: 1500 to 5000 watts. Voltages: 115 or 230 volts, 60 cycle, single-phase a-c.

The Homelite high-cycle generator delivers 230 volts, 180 cycle, 3 phase a-c power for high-cycle electric tools and 120-v d-c power for Universal tools and lights. Also available is a special 20 lb back-pack generator for geophysical work.

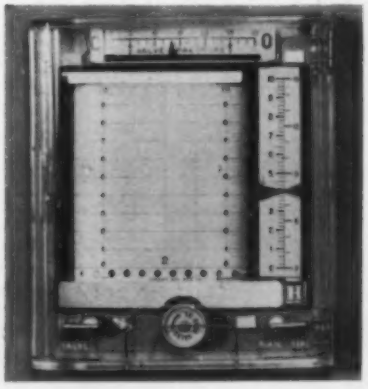
Homelite Division, Textron, Inc.

Improved Miniature Recorder

374 In the field of miniature pneumatic instruments, the Honeywell Tel-O-Set recorder offers distinct advantages in convenience and operating efficiency for the petroleum industry. Accurate, sensitive, and with true linear calibration, it responds rapidly to process changes. Linearity is built-in at the factory and requires no attention. Zero and span are the only adjustments necessary and can be made easily.

The case, complete with pressure regulator and output pressure gage, can be completely piped into place before startup time. Connections can be made, air lines checked, and value operation tested before the chassis is installed.

Recorder and indicator chassis are interchangeable. This means that a recorder can be changed to an indicator or vice versa without process downtime. Since the pressure regulator and output pressure gage are part of the case, you don't lose control of the process, even though the chassis is completely removed.



Recorder can be used with any pneumatic force-balance controller. A screwdriver adjustment provides the necessary internal circuitry for external reset feedback, air-to-relay for automatic operation, or air-to-relay for manual operation. The controller for these instruments can be mounted on the rear of the receiver case, on the panel, or on the valve . . . whichever is most convenient.

Recorder uses a 3-in. strip chart which can be torn off daily without timing upset, or stored automatically for 30 days. Over 250 charts and scales are available to meet the most exacting requirements.

All adjustments and normal servicing can be done from the front of the panelboard. All working parts can be inspected during operation, simply by partially withdrawing the chassis. The pressure regulator can be removed from the back of the case without breaking electrical connections, so there is no need to have an electrician stand by.

Minneapolis-Honeywell Regulator Company

Precision Hand Calculator

375 New Curta calculator will add, subtract, multiply, divide, square, cube, extract, square root, etc. Any problems ordinarily performed on a large desk type calculator can be done on this calculator weighing only ½ lb. It can be carried in the pocket or brief case, is precision made, all metal construction and is Artic, tropic and rust proof.

Unit is a simple, rotary type calculator, scaled down in size and constructed like a fine watch. It's compact design and sturdy construction makes it equally reliable for field, shop or office use. Curta calculator is made in two sizes. Model No. 1 will total up to 99 billion. Model No. 2 will total up to 999 trillion.

Utility Supply Company

Ammonia Absorption Refrigeration Gas Conditioning

376 The BS&B Ammonia Absorption Refrigeration Unit is a new automatic system that produces low temperatures for natural gas conditioning anywhere from the lease through central plant to refinery. It can be used for hydrocarbon dewpoint control in pipelines, to increase hydrocarbon recovery with low temperature separation units where there is no available pressure expansion, and to increase gasoline plant hydrocarbon recovery up to 100 percent by chilling the absorption oil. Package unit includes all controls and accessories necessary for efficient, completely automatic operation.

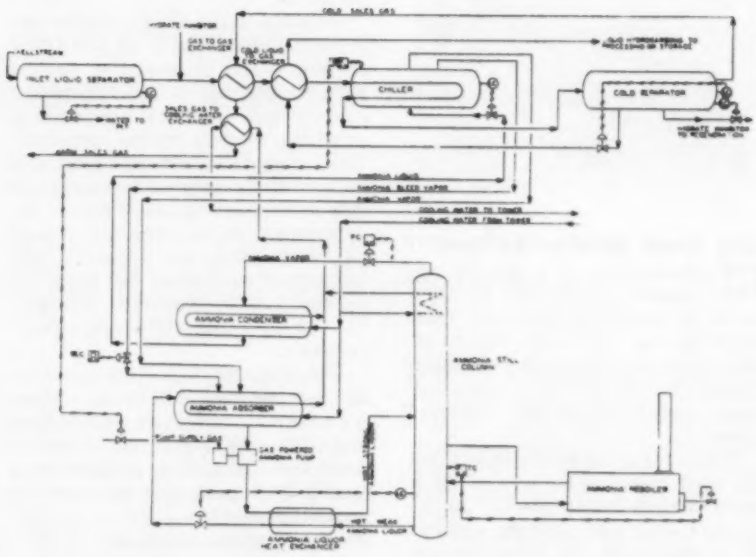
Designed and built for heavy duty and continuous operation, ammonia absorption refrigeration unit provides trouble-free, completely automatic, unattended operation under widely fluctuating loads with minimum maintenance expense. Power input required is proportional to load imposed on the unit, and capacity decreases only slightly with a decrease in operation temperature. With no high speed reciprocating machinery to mount, the unit is vibration-free. Elimination of oil lubrication eliminates the oil-refrigerant problem. It is adaptable to any set of working conditions, and sudden load changes will not throw it off the line.

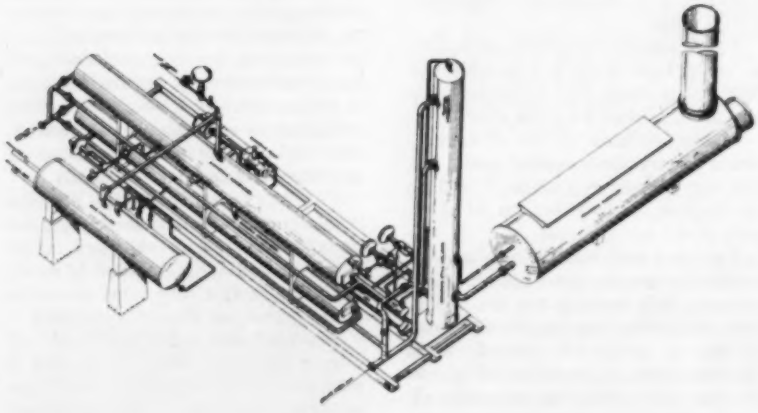
In operation, ammonia is continuously absorbed, distilled, condensed, evaporated and reabsorbed.

Liquid ammonia flows from the condenser through a float-operated expansion valve to the chiller where it is evaporized by gas passing through the chiller coils. Ammonia vapor then flows to the absorber where it is absorbed by a weak ammonia liquor spray. This process generates considerable heat which is removed from the absorber by cooling water.

The absorption of ammonia vapor by the weak liquor forms a strong ammonia liquor which is pumped through the heat exchanger to the still column operated at an elevated pressure. In the heat exchanger, the strong liquor picks up heat from the hot weak ammonia liquor coming from the still column.

Ammonia is vaporized from the strong ammonia liquor in the still column by heat supplied by the reboiler. Water vapor is removed from the hot ammonia vapor in the top of the still column by reflux from the water-cooled partial condenser, making the ammonia vapor virtually pure as it flows from the top of the still column to the water-cooled condenser. Cooled and condensed at near the still pressure, the liquid ammonia collects in the bottom of the condenser and is recycled to the chiller.





Standard ammonia absorption refrigeration units are readily skid-mounted except for the ammonia reboiler which is on a single skid. There are 11 available sizes with capacities ranging from 8 to 200 tons at −10 F chiller temperature.

Black, Sivalls & Bryson, Inc.

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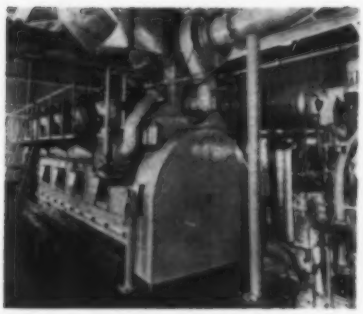


Turbocharging Increases Horsepower

377 By means of a new series turbocharging development, horsepower output of 2-cycle engines can now be increased substantially. Fuel consumption can be cut up to 12 percent depending upon the type of engine. Units accomplishing these results are already in continuous operation on pipeline and refinery service. At Panhandle Eastern's Seward Booster Station a Cooper-Bessemer Type GMVC-6 2-cycle engine-driven compressor normally rated 800 hp at sea level is pulling as high as 1100 hp on ambient air as high as 95 deg. Elevation is 2800 ft; at sea level it would pull 1144 hp.

The series turbocharging system is completely self starting. There are no mechanical disconnect devices. It retains all the starting characteristics of the mechanically scavenged engine.

The series turbocharging system, in which one stage of scavenging air compression is accomplished by a mechanically driven centrifugal compressor, and the other stage driven by the turbocharger, is particularly applicable to high elevation. This means that 2-cycle engines can now be equipped for operation at elevations up to 7500 ft without any deration in engine horsepower.

Cooper-Bessemer's new turbocharging development can be installed on new engine-driven compressors at the factory or applied to existing Cooper-Bessemer Type GMVA and GMWA engines already operating in the field. Conversions are made without special tooling or complex assembly with approximately 3 days downtime.

The Cooper-Bessemer Corporation

Personalized Commercial Communication

378 Development of the first commercial pocket-size radio receiver for mobile communication service is reported to be the forerunner of a complete line of revolutionary personalized receivers and transmitters for commerical communications. A fully transistorized, 10-ounce instrument designed by RCA, it provides extension for radio systems now operating on the 150-megacycle band. It will become available commercially later this year, following nationwide field tests.

Pocket-size instrument is a single-channel device designed for operation on any frequency in the 148 to 174 megacycle band.

Fully transistorized and featuring printed circuitry, the pocket-size receiver incorporates its own antenna and loudspeaker, obviating need for a separate ear piece, and can be directly contacted by the sending station without need of additional equipment. It measures only 2¾ in. wide, 1 in. thick, and 6½ in. high; weighs approximately 10 ounces, and operates with self-contained flashlight-type mercury batteries.

Receiver is designed to extend existing 105-megacycle radio systems and can be used to take direct or relayed transmission from both fixed and mobile stations. In operation the experimental receiver is carried in the pocket in an "on" position, enabling the carrier to hear all messages transmitted by the sending station on its 150-megacycle frequency.

Radio Corporation of America

New Tank Gage System Developed

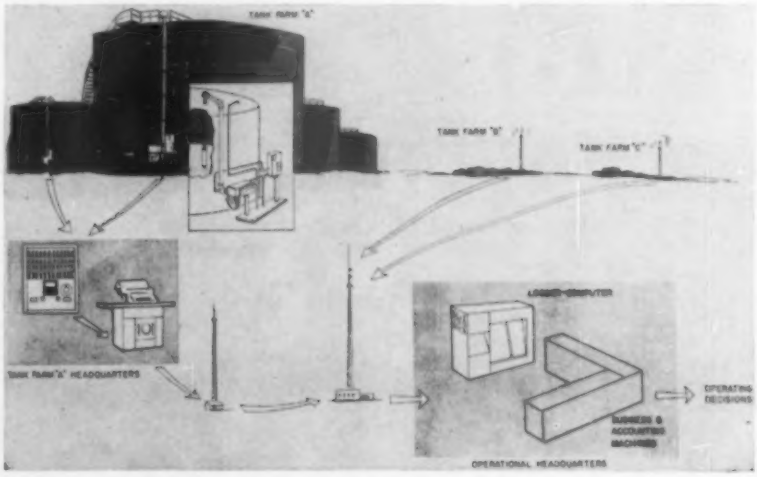
379 An important new system being offered to the petroleum industry is a coordinated tank gaging and logging system utilizing the Gilbarco Electronic Tank Gage and F&P data reduction equipment.

In March of this year, in accordance with an agreement between Gilbert and Barker Company and Fischer & Porter Company, the marketing of the Gilbarco Tank Gage and the manufacture of the Gilbarco Null Balance Tank Level Receiver was assumed by F&P. The gage and receiver, when combined with data reduction equipment, offer a complete system for tank gaging, featuring immediate digital readout of tank levels and temperatures on any type of digital readout equipment.

System can be used, as well, for collection at one central station of signals telemetered from a number of tank farms. Data converted from such signals are available for immediate analysis or for storage. Fischer & Porter is currently developing an extension of this telemetering function to include a greater geographic spread. When developed, this system will make possible the national coverage of tank farm installations. Data from widely scattered tanks would then be available at once for such purposes as centralized inventory control.

The Gilbarco Gage operates by using an extremely sensitive, servo-operated probe to detect absolute liquid level in a tank, with only the tip of the probe touching the liquid. Minute, high-frequency signals of a phase and magnitude determined by degree of contact of the tip with the liquid cause the tip to follow the slightest variation in level. The gage is unaffected by variations in the specific gravity of the product. Applications include use on pressurized tanks, on corrosive mediums and on difficult materials, such as asphalt. An absolute accuracy of ±1/16 in. over the entire range of level is assured. Installation is made without guide wires or costly construction of any kind within the tank and without taking the tank out of service.

Fischer & Porter Company



Four-Wheelers for Rough Terrain

380 Of prime interest to the petroleum industry is the recent addition by Chevrolet of 12 four-wheel drive models to its line of 1957 trucks. The rugged "4 by 4's" offer power and traction qualities especially applicable in this field. Deep sand and mud, steep grades and difficult terrain that would defy the conventional truck are readily conquered by 4-wheel drive units.

Vehicles will be available as a Suburban Carryall; ½, ¾ and 1-ton pickups; 1-ton panels and ¾ and 1-ton stake trucks.

Power from the engine is supplied through a 4-speed transmission, then split between the front and rear driving axles through a 2-speed transfer case. With the transfer case in direct drive, either 2 or 4-speed drive is possible without using the clutch. Shifted to underdrive, powerful 4-wheel traction is locked into operation.

Four power take-off locations are available to serve a number of special applications for the vehicle. The 4-speed transmission carries a left side power take-off opening, and the power divider offers 3 locations—at front and rear of the case and on the left side.

Both front and rear axles use the same pinion, ring and differential gears to provide equal pulling power at the front and rear wheels. Interchangeable parts assure complete stocks.

To provide steering ability with a drive axle installation, the front wheels are driven through constant velocity universal joints, delivering a flow of power in all turning positions. The rugged construction of these Rzeppa joints insures a long, trouble-free service life. Coupled with ball-gear steering, firm and positive control is provided.

Tested by millions of miles of use in the hands of truck owners, the 6-cylinder Thriftmaster engine powering the 4 by 4 is well adapted to the grueling service expected of 4-wheel drive vehicles.

Chevrolet Motor Division, General Motors Corporation

Chevrolet Four-wheel Drive Vehicle Specifications.

		Half-Ton	Three-Quarter Ton	One-Ton
GROSS VEHICLE WEIGHT		5400	7300	7400
WHEELBASE (Inches)		114"	123¼"	135"
AXLE (Front) RATING, RATIO		3000, 3.90 to 1	3300, 4.57 to 1	3500, 5.14 to 1
AXLE (Rear) RATING, RATIO		3300, 3.90 to 1	5000, 4.57 to 1	7200, 5.14 to 1
SPRINGS (Front) CAPACITY		1360 to 1430 depending on vehicle type		
SPRINGS (Rear) CAPACITY		1570, 2400 and 2430 depending on vehicle type		
ENGINE	Type	Thriftmaster, Valve-in-Head, 6-Cylinder		
	Size	235.5 Cubic Inches		
	Bore & Stroke	3⅝ x 3⅕		
	Gross Torque	210 foot pounds at 2000 rpm		
	Gross HP	140 at 4200 rpm		
	Comp. Ratio	8.0 to 1		
TRANSMISSION	Type	4-Speed Synchro-Mesh		
	PTO Opening	6-bolt (SAE Standard) on left side		
POWER DIVIDER	Type	2-speed; 2 or 4 Wheel in Direct—Neutral—4 Wheel Underdrive		
	Shift Location	On floor of Driver Compartment		
	PTO Openings	At front and rear of case; at bottom left side of case		
DRIVE SYSTEM		Hotchkiss; 2 Wheel or 4 Wheel Drive		
FUEL TANK CAPACITY		15 to 17½ gallons depending on vehicle type		

Company Pioneers Housing Plan

382 Whitmor Homebuilders, Inc. originated what is unquestionably today's most popular industrial housing plan — the lease-rental arrangement. Whitmor homes span the nation and have wide acceptance throughout the petroleum industry.

Whitmor lease-rental plan is a comprehensive plan for complete company housing and related facilities. The plan can include distinctive homes, recreational buildings and facilities, swimming pools, office buildings, warehouses, etc. Plan can also include basic site planning, water, sewage, electrical systems, fencing and landscaping. The entire custom-built project is then rented to the company. This eliminates company capital investment; instead, monthly payments are chargeable to company operating costs.

Sometimes corporations have housing problems not directly connected with plant installations, but instead have a sizeable number of employees working in a general area where available in-town housing in inadequate. In such instances Whitmor develops a housing program in any city the corporation may select, and the same lease-rental plan applies. This plan also is advisable when industrial developments have indicated short-term duration — homes can be more easily re-sold if located in a city rather than in an isolated camp site.

Whitmor's lease-rental is only one way to purchase housing. Many firms prefer the regular contract basis of building. Company prides itself on the quality of construction at low competitive prices.

Only finest quality materials are used for home construction and for interior equipment and decoration. Whitmor and its many customers discovered long ago that quality-built homes amid pleasant and attractive surroundings are the basis for retaining satisfied, more efficient employees. Better employee relations begins with better homes for employees' families.

Whitmor Homebuilders, Inc.

A typical industrial home scene constructed in a remote area to attract and keep the best employees.

Transistorized Alarm Transmitter

381 New Hammarlund AT-4 Alarm Transmitter is designed to provide positive power failure alarm for centralized operations control systems.

It is basically a battery-operated, transistorized tone transmitter keyed by a relay which holds in the off position as long as line power is on. Immediately, upon line power failure, the relay is released, triggering the self-contained, battery operated tone transmitter. This tone is transmitted through the system warning the central station of the power failure.

Alarm is designed for use in systems utilizing Hammarlund COC equipment. COC equipment is audio tone signalling remote supervision gear which has found wide-spread use in the petroleum processing and gas distribution fields.

Hammarlund Manufacturing Company, Inc.

Research laboratory and, right, an interior view showing suspended concrete and terrazzo stairway in lobby.

Research Feeds Petrolite Progress

WHEN your largest selling product is only three years old and none of the products you sell are as much as 20 years old, you can imagine there's been some research work done. That is true of the Tretolite Company, a division of Petrolite Corporation, which opened its new research laboratory last month. The Petrolite Research Laboratory is on the same 41-acre plot in Webster Groves, Missouri, that holds the Tretolite Manufacturing Plant. The Research Group will serve Tretolite, Petreco, Petroleum Rectifying Company of California, and Bareco Wax Company, and four subsidiaries.

Activity for Petrolite Research includes work on:

1. *Oil treating chemicals*, particularly demulsifiers. These demulsifiers are constantly improved by testing actual field samples, which are fed into the laboratory constantly. In addition to the new research plant there are mobile laboratories that conduct on-the-spot analyses in the field.

2. *Corrosion inhibitors and corrosion prevention*. Already Petrolite Research has developed organic film-forming products for use in finished products pipelines.

3. *Water flood and water disposal stimulators*. Combined benefits of a corrosion preventive, scale inhibitor, bactericide, and wetting agent help improve the speed of injection.

4. *Bactericides*. These are designed to combat bacteria which plugs formations and insoluble iron sulfide.

5. *Electrofining*. A method of purification to deliver fuels of maximum purity. Includes research into super-purification of highly refined jet fuels.

6. *Microcrystalline waxes*. This research extends into many industries such as manufacture of polishes, packaging, electrical installations, etc. The company has already shown that fine waxes can be manufactured from petrolatums and bottom settlings in storage tanks. Latest result of this project is a wax for typewriter carbon paper inks which has superior performance.

Petrolite Research is primarily in the petroleum field, although some developments have lead to uses in other industries.

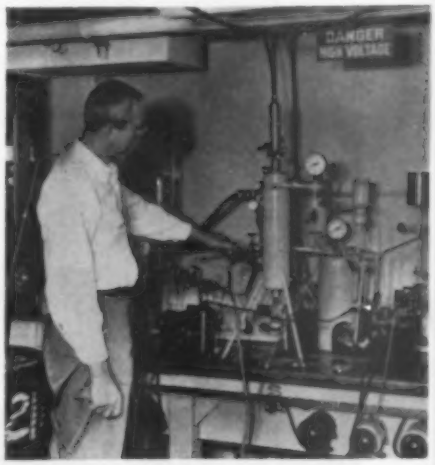
You might say the research began in 1906 and 1907 when Dr. F. G. Cottrell, a professor at the University of California, and William S. Barnickel, a St. Louis chemist, began working on methods for separating oil from emulsions. The chemicals used by Barnickel were named "Tret-O-Lite," later the company designation. Cottrell's work on separation by electric force was carried on by the Petroleum Rectifying Company, now "Petreco."

A research laboratory is no better than the men who direct it. The new Center fares well there, too. C. M. Blair, president of Petrolite, was Director of Research from 1943 to 1953. He has his AB and AM from Rice Institute. Immediately after receiving his PhD in chemistry from California Institute of Technology in 1935, he joined Petrolite.

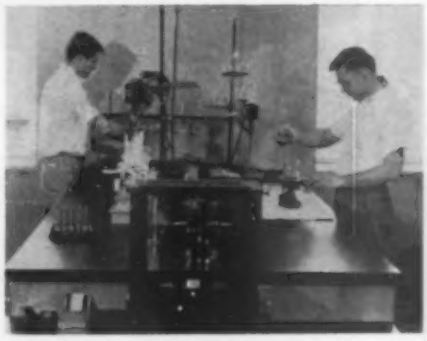
Present director of research, G. J. Samuelson, succeeded Dr. Blair in the post. He has his MS and PhD from University of Nebraska. Before joining Petrolite in 1943 he was associate professor of chemistry at Texas A & M.

Melvin De Groote, who has been with the company more than 30 years, is vice president in charge of research, developments and patents. He has his BS and chemical engineering degrees from Ohio State University, which in 1955 awarded him the honorary Doctor of Science degree.

A number of bright young men work under these distinguished three. And the new laboratory will doubtless attract more. ★ ★ ★



Pilot plant used to make accurate prediction of large scale electric distillate treating (Electrofining) operations.



Typical laboratory rooms. For two-man occupancy, above, and for one man, below.

Coupling Features Rubber Tire

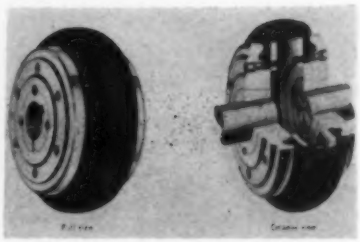
383 New conception in flexible couplings is the latest addition to the Dodge line of power transmission machinery.

Ability to handle angular mis-alignment, parallel mis-alignment and end-float, and in any combination, is only one of many advantages claimed for the coupling. Flexible member also cushions shock loads and diminishes torsional vibration, thus protecting both the driver and the driven machine.

Called the Para-flex Coupling, it is basically a tire with tension members bonded together in rubber. In fact, new coupling was made possible by technological advances in the manufacture of modern automobile and truck tires. Four-way flexing body of Para-flex outperforms the most complex coupling mechanism, yet operates with simplicity and dependability.

In addition to its many operational advantages, Para-flex has other highly desirable features of installation and maintenance.

Coupling consists of the flexible tire



clamped between 2 hubs which are mounted on the shafts to be coupled. The flexible member is held between the flanges and clamp rings of the hubs. The tire has a transverse split molded into it, which permits easy installation and makes replacement possible without moving driver or driven machine. To make a change it is only necesasry to loosen the cap screws enough to allow removal of the tire and to fit a new one in place.

According to Dodge engineers, unit will take angular mis-alignment up to 4°, parallel mis-alignment up to ⅛ in., and end-float up to 5/16 in., contingent upon the size of the coupling and the duration of the conditions. Resilience of the flexible member cushions shocks to a remarkable degree, smoothing out the load for both driver and driven machine. Torsional vibration is absorbed to a great degree.

Couplings are available from factory stock in capacities up to 600 hp at 900 rpm.

Dodge Manufacturing Corporation

Panel Protects Compressor

384 Southwest Packaged Gas Compressors can now be furnished with automatic shutdown and panelboard indicator equipment custom built to the particular requirements of your station. Any combination of automatic shutdowns, working through a solenoid controlled valve in the fuel gas system, protects your engine against malfunction.

During normal operation, the signal lights on the panelboard remain off. When any one control switch becomes actuated due to abnormal operation, the signal light corresponding to that switch goes on. The engine shuts down automatically. All other relays are locked out, and the one signal light remaining on indicates the exact switch which caused the engine to shut off.

As many as 15 separate functions can be pinpointed by this panel indicator. Your maintenance men can get your compressor back on stream faster. Southwest engineers will give you full details on this protective equipment for unattended compressor operation.

Southwest Industries, Inc.

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POWER PERFORMANCE
in a light weight, man-size
WISCONSIN
Air-Cooled
ENGINE
the NEW
56 H. P.
Model VR4D
4-Cylinder Engine
• Climaxing years of engineering development, this great new engine offers manufacturers and users of power equipment all the advantages of AIR-COOLING, at temperatures from low sub-zero to 140° F., in an exceptionally rugged engine that measures up to any "heavy weight" industrial type liquid-cooled engine, horsepower for horsepower, with many plus values.
The outstanding High Torque characteristic of the Model VR4D engine, combined with its extremely rugged construction and heavy-duty stamina, provide load-lugging holding power, long life and top power performance.
Advanced "V" design provides an extremely compact power package which includes all traditional Wisconsin heavy-duty features such as tapered roller main bearings plus additional new features.
•
This new engine rounds out a complete line, comprising 15 models in 4-cycle single cylinder, 2- and 4-cylinder sizes, from 3 to 56 hp. Write for "Spec" Bulletin S-207.
Model VR4D Open Engine with heavy-duty clutch, rotating screen, electrical equipment and pre-cleaner.
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Thin Layer Welds Plastic Pipe

385 A paper-thin layer of plastic on a section of the inside wall of a new plastic pipe fitting developed by United States Rubber Company promises to do away with leaky joints in solvent-welded plastic pipe installations.

The plastic layer, only a few thousandths of an inch thick, makes the inner half of the fitting slightly smaller than the outside diameter of the pipe it is used to join. But a light coat of solvent-base cement on the inside of the fitting, and on the pipe end, softens the plastic layer so the pipe can be pushed snugly into place.

High contact pressure between pipe and fitting causes a positive weld, say the rubber company's design engineers. The weld is strong enough within seconds for ordinary handling, and in about 2 hours the solvent-softened plastic in the weld area has completely hardened so the joint is as strong as the pipe itself.

The new fitting also has a flared entrance so pipe can be inserted quickly and easily. This also aligns the pipe automatically for welding.

Conventional cemented socket-type fittings, in contrast, have an inside diameter equal to, or larger than, the outside diameter of the pipe on which they are used. When tolerances are not held in forming the pipe, or the fitting, the solvent cement fills gaps between the pipe and fitting, causing a weak weld.

The new fittings, called Uscoweld, are made of a styrene-acrylonitrile blend. It is a tough, lightweight plastic with good corrosion resistance. The same material is used in Uscolite pipe and Uscolite screw-type fittings.

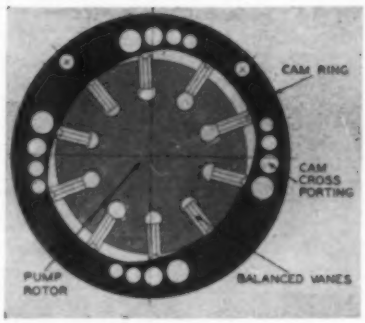
A range of Uscoweld fittings for standard size pipe from ½ to 2 in. in diameter is now being made. A series of fittings for larger diameter pipe is also planned.

United States Rubber Company

Speed Reducer

386 Western Gear Corporation has designed and is manufacturing a new in-line series of speed reducers marketed under the trade name "Strait-Line." StraitLine reducers are available in double and triple reduction. Double reduction units are offered in 15 standard ratios from 3.39:1 to 57.3:1 with ratings up to 100 hp. Triple reduction units are available in 9 ratios from 82.1:1 to 190.7:1 with ratings up to 50 hp. Units feature complete interchangeability of individual parts throughout frame sizes as well as packaged sub-assemblies.

Western Gear Corporation



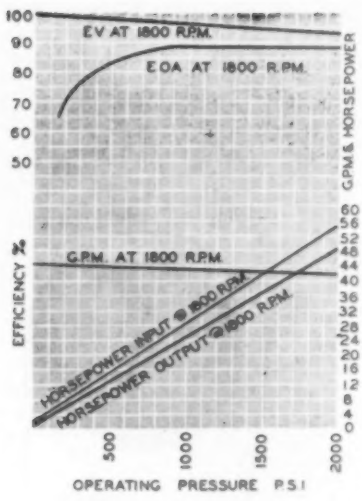
2000 PSI Vane Pump

387 Series of balanced vane hydraulic pumps for continuous 2000 psi service has been announced by the Denison Engineering Division, American Brake Shoe Company.

The "T" Series, pumps feature hydraulically balanced vane and are offered with deliveries of up to 100 gal per min at speeds up to 1800 rpm.

Two bolt threaded flanges are provided as standard equipment but 4 bolt hydraulic connections are available for those desiring to use SAE 4 bolt split flange connectors. A nose type shaft seal, designed to withstand inlet pressures up to 100 psi gage, provides a positive type seal with considerably longer life than the lip type seal. This pump may be face, foot or flange mounted in any of 4 positions on its mounting bracket.

Denison Engineering Division, American Brake Shoe Company



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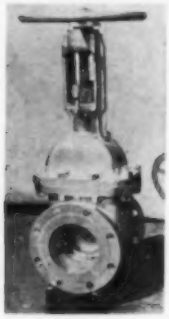
Valve Has Multiple-Seal

388 A new, less expensive Multiple-Seal Gate Valve, for services where aromatics, hydrocarbons or LPG require a positive shut-off, has been introduced. Valve was developed after several years of field testing, and according to the manufacturer it replaces the common double block and bleeder installation with only one valve.



The Greenwood Multiple-Seal Gate Valve offers, in effect, 4 separate seals . . . 2 precision metal-to-metal seats and 2 secondary "O" Ring Seals to insure against leakage. Tightness of shut-off can be checked at any time by means of a bleeder connection incorporated in the valve bonnet. The valve operates in the same manner as any conventional gate valve with a rising stem. However, because of it's precision seats and "O" Ring Seals, this valve is closed hand-tight only and no snipe should be used.

Multiple-Seal Gate Valves are currently available for 150 lb working pressure in sizes from 4 through 12 in. All face-to-face dimensions, wall thicknesses, and flange dimensions conform to ASA specifications.

Greenwood Valve Division, Vernon Tool Co., Ltd.

Transistorized Transceiver

389 The 464-TR Transceiver provides reliable voice communication channels over existing telephone or power lines where additional talking facilities are required. It can be used on any frequency between 5 kc and 200 kc where the total attenuation does not exceed 85 db with each voice channel occupying a bandwidth of 3000 cycles.

Plug in modular construction together with printed circuitry is employed and the complete transceiver is mounted on a standard 8¾ by 19-in. panel. Because the transceiver is completely transistorized, the total battery drain from a 24-v d-c source is only 400 milliwatts when receiving and 4 watts when transmitting. Selective calling components are mounted on an adjacent panel.

Equipment is applicable to any service where physical circuits are limited by line noise or overloading and will provide additional talking circuits at a fraction of the cost of installing additional physical circuits.

Erco Radio Laboratories, Inc.

Explosion Proofed Gage

390 New gages have been designed primarily to provide maximum safety to observer from possible bursting of bourdon tube because of excessive pressure, corrosion, or any other damage.

These gages are built to embody the same features of the Weksler pressure gages with the additional feature of an integrally cast solid metal wall separating the internal mechanism of the gage from the dial. In addition the mounting flange has been provided with 3 integrally cast bosses allowing 5/16 in. of space between blowout plate and the wall or panel in the event they are so mounted. The back of the case is sealed by a metal plate properly gasketed and held in place by a spring mechanism fixed to the internal side of case. In the event of bourbon tube rupture, this mechanism allows back plate to spring open thus releasing the pressure force without becoming completely detached from the instrument.

Safety gages can be furnished in 4½, 6 and 8½-in. dial sizes in all standard pressure ranges up to and including 10,000 lb.

Weksler Thermometer Corporation

Vacuum Cuts Maintenance Costs

391 One sure way to solve the problem of clouded sight feed glasses on lubricators—simply remove the liquid from the sight glass. That's exactly what Manzel has accomplished with its Model 82-V Vacuum Pumping Unit, a new design with a minimum of working parts.

How it operates: Flow of oil out of the drip tube is caused by a vacuum created within the sight chamber during the suction stroke of the pump plunger. Because the drip tube is connected to the suction tube, and there are no check valves in the suction line, the sight chamber is always under less than atmospheric pressure during operation. Any leakage of oil around the plunger due to normal wear will cause the oil to flow to the point of lowest pressure — the sight chamber. Consequently, any leakage will be indicated by a reduction in the rate of flow from the drip tube.

This vacuum type pumping unit virtually eliminates maintenance on the lubricator, except for normal wear. Because there are no liquids in the sight glass to affect the size of the drop, a much more uniform drop size is constantly maintained. In addition, even extremely light-colored oils are readily visible.

Greatly increased accuracy in settings is another big advantage. The plunger always takes a full stroke, regardless of how much oil is delivered. Feed regulation is the same as on liquid feed types — the regulator is turned to the right or left. On some of the smaller models with small plungers, delivery can actually be cut down to about a sixth of a drop per plunger stroke and accurately maintained.

Model 82-V is fully interchangeable with regular tubular and bullseye feeds on other Manzel lubricators. When installing the unit as a replacement, it is not necessary to rework the reservoir or remove the lubricator from the engine.

Manzel, a division of Houdaille Industries, Inc.

Commercial Washers

392 A washing machine to wash anything anywhere. No need to be without clean uniforms, gloves, wiping rags, etc.—wash them on the job. Many operators have cut costs 50 percent.

Made of stainless steel throughout, washer can be adapted to many special applications, oil barges, oil tankers, refineries, drilling rigs. It can be supplied in special voltages for special application. Submit your specific problems to the manufacturer for estimates and recommendations.

Units are made in 25, 50, 75, and 100 lb capacities, manual, semi-automatic, and fully automatic.

Cook Machinery Company, Inc.

Welded Transducers

393 To permit the use of ultrasonic equipment with all types of active detergents, solvents, alkaline cleaners and even some mild acids, Branson Ultrasonic Corp. has developed a new line of transducers with cleaning areas up to 84 sq in. Because the housings of type AISI 316L stainless steel now have arc-welded joints, the resulting transducers are leak-proof and highly corrosion-resistant.

Two types of welded transducers are currently available from stock, both in a wide range of sizes. The B series is fitted with a Teflon-gasketed bulkhead mounting, so that the electrical connection with the cable coming from the ultrasonic generator is made outside the cleaning tank. E series transducers are completely immersible in the cleaning fluid. One end of this type of transducer is fitted with a standard pipe thread (¾ in.) into which a stainless steel adapter is screwed. It permits the insertion of a Teflon-lined flexible stainless steel sleeve, carrying the "hot" lead from the transducer to a junction box on the outside of the tank. Shorting or grounding of the high-voltage lead or accidental damage to it is unlikely due to several layers of Teflon insulation and the braided steel sleeve surrounding it.

In addition to being completely water-tight, the new modular transducers have also been designed for optimum utilization of space. All edges are square, so that several units may be mounted next to each other with no more than 1/32 in. clearance. Dimensions are such that transducers are easily stacked, and almost any geometry is possible. Transducers may be mounted at the bottom of a tank or its side and, where desired, may be positioned to focus the ultrasonic energy in a very small area for maximum intensity. The transducers are available in many sizes, with effective cleaning areas for a single unit ranging from 3 by 5⅜ in. up to 6 by 14 in. When several are connected in parallel, up to 5 sq ft of transducer area can be driven from one Branson ultrasonic generator.

Typical applications of this ultrasonic equipment are cleaning of meters and instruments without disassembly, electrical and electronic components, bearings and many other similar items.

Branson Ultrasonic Corporation

Antiknock for Aviation Gasoline

394 Ethyl Corporation reports that a new antiknock compound for aviation gasoline developed in its laboratories has permitted power gains of up to 20 percent in full-scale engine tests. The compound, designated tentatively as AK-33X, was used in the tests to supplement the antiknock action of tetraethyl lead and thereby provided greater gains in antiknock value than obtainable with tetraethyl lead alone. The tests were conducted at the engineering laboratories of the Wright Aeronautical Division of the Curtiss-Wright Corporation in Wood-Ridge, New Jersey.

Although AK-33X is still in the research and development stage, it was being announced at this time to advise refiners who make aviation gasoline of the possibilities of the new additive.

Ethyl meanwhile is studying the broad applications of the discovery, including the potential use of AK-33X as a supplementary additive for motor fuels.

New compound is one of a new class of chemical compounds being investigated by Ethyl's research laboratories. Of these AK-33X—an organic compound of manganese—appears to be the most promising.

Ethyl Corporation

Building With Modern Profile

395 Low profile, pre-engineered metal building having a roof pitch of 1 in 12 is being produced by Butler Manufacturing Company. While imparting the general appearance of the modern, flat roof design to the finished building, new low pitch retains the advantages of a gable roof. Wide span rigid steel frame provides the broad, sweeping look so prominent in today's architecture.

Low pitch steel framework is so strong it can span floor areas up to 100 ft wide without the use of any interior posts or roof trusses. Interiors are wide open, permitting unrestricted layout planning, partitioning, illumination, heating and decoration.

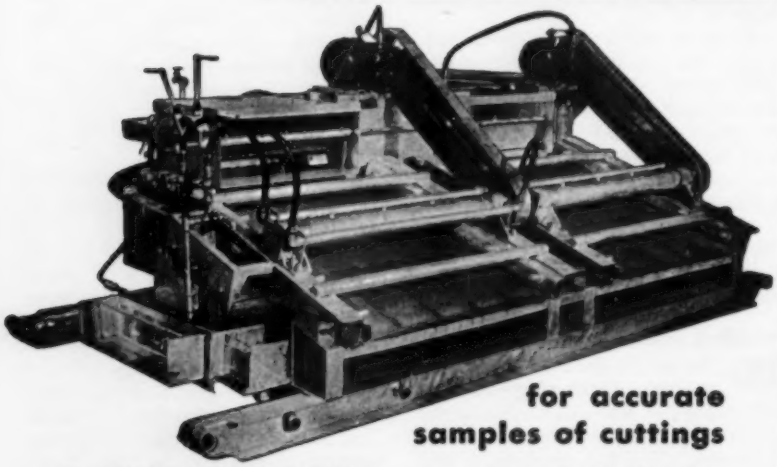
Like other Butler building components, units are pre-engineered and mass produced to fit together perfectly and speed construction time. Exterior walls can be metal or any of the many traditional materials including large expanses of glass, because the walls are non-load bearing. Exteriors can be architecturally planned to suit the preference of the owner for harmony with use, character of building and surroundings.

Butler Builders throughout the United States and Canada have sales and complete construction service for the new low, rigid frame building in their exclusive areas.

Butler Manufacturing Company

Thompson

DOUBLE VIBRATING SHALE SHAKER...and SAMPLE MACHINE



for accurate samples of cuttings

The THOMPSON SHALE SHAKER SAMPLE MACHINE offers the operator and geologist one of the best methods available for obtaining accurate foot-by-foot samples of well cuttings.

This THOMPSON DOUBLE VIBRATING SHALE SHAKER and SAMPLE MACHINE is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or galvanized, which makes it rust and deterioration-proof on off-shore or coastal duty

THOMPSON Shakers are famous for their highly efficient service at any depth or flow and for their economical first cost.

Make sure THOMPSON'S on the job for accurate samples and clean mud.

SOLD ONLY THROUGH SUPPLY STORES

Thompson TOOL CO. IOWA PARK, TEXAS

New Truck Line

396 High-efficiency truck engine, greater driver comfort, and maneuverability are features of new International light-duty, 4-wheel-drive truck with 7-ft pickup body. One of scores of models in the newly-introduced International truck A-line, the A-120 (4 by 4) is rated at 7000 lb gross vehicle weight. It is powered by a 141-hp International Black Diamond engine. A 154-hp BD-264 engine is optional. Wheelbases range from 110 to

129 in. The new International A-line offers a broad selection of models from 4200 to 33,000 lb, in 4 and 6-wheel and all-wheel-drive conventional and new cab-forward design. A choice of 5 gasoline and 4 LPG-fueled International valve-in-head, 6-cylinder engines are available for A-line models. Horsepower ratings of these high-torque powerplants range from 112 to 154.

International Harvester Company

• Industry
• People
• News

The Trade PARADE

Walter S. Secrist has been appointed chief engineer at the Nielsen Pump Works, U. S. Steel's Oil Well Supply Division. He succeeds **Edward E. Stevenson,** who was appointed special consultant at the Nielsen Works.

I. E. Boberg, chief engineer of the Chicago Bridge & Iron Company, has been elected a vice president, and **Leo J. Marcoux,** controller, was elected secretary.

A. G. Herrick is now industrial sales manager for Martin-Decker Corp. Former sales manager **Roy I. Boydston** has been promoted to product engineer.

William J. Reddington has been appointed St. Louis district sales manager for the mechanical goods division of United States Rubber Co. He replaces **Hugh Reynolds,** who has retired.

Glen E. Wilber has been named an account executive for Rives, Dyke & Company, Houston, Texas, advertising agency. He has had extensive and varied experience in oil industry fields, specializing in advertising, public relations and sales promotion work.

Edward S. Aucoin has been promoted to purchasing agent for Delta Tank Manufacturing Co., Inc.

F. T. Daly has been appointed East Coast and southeast sales representative for RCA microwave equipment and systems. He succeeds **L. R. Vincent,** who recently was appointed to a sales post with RCA's West Coast electronic products department. **F. H. Long** will succeed Daly as microwave marketing and sales analyst.

New officers of the American Welding Society are **Clarence P. Sander,** president, Consolidated Western Steel Div., United States Steel Corp.; **Gustav O. Hoglund,** first vice president, Alcoa Process Development Laboratory; **Charles I. Mac Guffie,** second vice president, General Electric Company, and **Harry E. Rockefeller,** treasurer, Linde Air Products Co.

H. J. Godschalk, manager of advertising and public relations for the George E. Failing Company of Enid, Oklahoma, has been "loaned" to the Oklahoma Semi-Centennial Exposition management on a part-time basis to assist in publicity for the event.

Glen Horrie is now assistant export manager of McCullough Tool Company.

Dr. Samuel S. Naistat has been promoted to manager of inorganic and physical-chemical research and development for Becco Chemical Division, Food Machinery and Chemical Corporation, and **Joseph Bomstein** has been promoted to assistant manager.

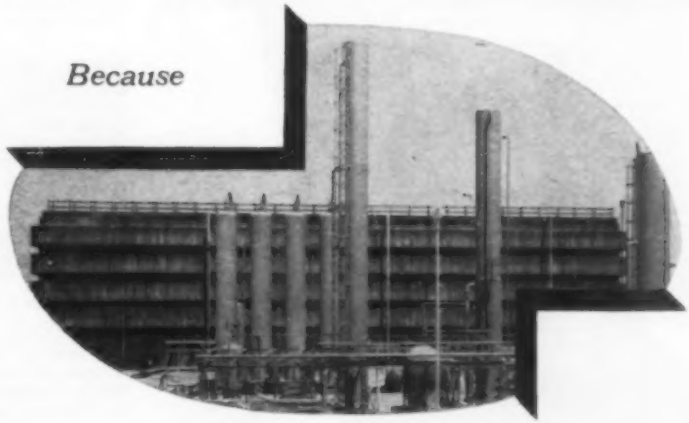
Jack W. Davis has been appointed regional sales manager for the Johns-Manville Corporation's pipe division, Rocky Mountain region.

Fred Drury of Weatherford Oil Tool Company, Limited, has been promoted from division manager to first vice president.

Chemical division of Celanese Corporation of America has appointed **H. B. Bartley Jr.** manager for the Middle Atlantic district, with headquarters in Wilmington, Delaware, and **Charles S. Aichler** district manager in St. Louis, Missouri.

E. O. Martinson, formerly president and general manager of Koehring-Waterous Ltd., Brantford, Canada, is now vice president in charge of research and development for Koehring Company's eight divisions and subsidiaries. **D. W. Marchant,** formerly vice president and general manager of Koehring Southern, has assumed the position vacated by Martinson. He is succeeded by **Harry S. Jeske,** formerly general superintendent at Koehring Southern. **Loring Click** is now plant superintendent in Chattanooga, Tennessee.

Your Plant Water Systems
MORE EFFECTIVELY PROTECTED



In Corrosion Inhibitors There Is A Difference

A difference which can be used to your advantage is present in the chemical composition and behavior of Haering's Organic Chrom Glucosates*.

A Chrom Glucosate* inhibitor film is tough, tenacious, elastic yet adherent, self-sealing and impervious. Is particularly effective in waters with high sulfate and chloride contents** or where process streams introduce various complex reducing contaminants. The organic Glucosates are used at low dosage rates over wide ph range. No more expensive and often cheaper to use.

Without cost or obligation find out how "Organic Methods" can provide extraordinary protection to water-using equipment in your plant.

**In use 8 years in a Cooling System where chloride content exceeds 25,000 ppm at times.

*Reg. U. S. Pat. Office

WE READ WATER H-O-H ESTABLISHED 1931 OVER 25 YEARS OF SERVICE

Call or write

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Fact 1

Once in a while a better product is made, and made so well, that it becomes the standard by which all similar products are judged.

Fact 2

The preference that you and millions of other users have shown for the RIGID Pipe Wrench puts on us the responsibility of keeping it always up to the top quality you expect of it.

The Ridge Tool Company, Elyria, Ohio, U. S. A.

Trade Parade

James S. Anderson, formerly general sales manager of the Tubular Products Division of The Babcock & Wilcox Company, has been elected a vice president of the company in charge of sales for that division.

J. S. Anderson

W. M. McGinnis

Walter Whetstone

William M. McGinnis has been promoted to Gulf Coast regional sales manager and **Walter Whetstone** to central regional sales manager of Black, Sivalls & Bryson, Inc.

Dan R. Gannon has been appointed field sales manager of Mueller Company. He will direct field sales activities throughout the nation.

James M. Smith has become eastern division manager for Weatherford Oil Tool Company. Previously he was district manager in Odessa, Texas.

J. B. Robinson

L. C. Dessert

L. A. Bainter Jr.

The Tretolite Company Division of Petrolite Corporation has reorganized and expanded its sales and service staff. The reorganization involves the creation of two new service divisions—the northwestern and the west central. **J. B. Robinson,** formerly assistant manager for the northern division, will manage the northwestern division. West central division will be managed by **J. L. Hampton** and will headquarter in Midland, Texas. Rocky Mountain division will be managed by **L. C. Dessert** and the southern division will be supervised by **L. A. Bainter Jr.**

Otis Pressure Control, Inc. has appointed **Jack Russell** manager of its division office in Odessa, Texas.

Perry Grandstaff has been elected executive vice president of Line Scale Company, Inc. He was formerly general manager.

G. W. Gutekunst

C. H. Rieman

Brice Maddox

George W. Gutekunst, C. H. Rieman and **Brice D. Maddox** have been elected vice presidents of Gardner-Denver Company.

Rear Admiral Robert A. J. English, U.S.N. (Ret.) has been elected president and director of Hall-Scott, Inc. **George A. Cavanaugh** was elected a director of the company.

Harold N. Wilson has been named secretary-treasurer of the Parkersburg-Aetna Corporation.

Preformed Line Products Company has appointed **R. F. Hollitz** assistant general manager of sales, headquarters staff functions; **F. L. Irvin** assistant general manager of sales, representative-jobber functions, and **J. W. Ramey** manager of operations, Palo Alto, California, plant.

Don S. Permar has been named to the newly created position of assistant general sales manager for the Le Roi Division, Westinghouse Air Brake Co.

D. S. Permar

W. Adrian King

J. H. Mathis

W. Adrian King is now general sales manager of the Industrial Chemicals Division of Olin Mathieson Chemical Corporation. He was manager of the division's automotive products department.

Joseph H. Mathis is the new manager of the Illinois division of Hughes Tool Company. He replaces **Irving H. Bettis** who has retired after nearly 30 years of service.

J. Guy LaVergne has been promoted to chief engineer of Escambia Chemical Corporation in Pensacola, Florida.

W. J. Bowen has been promoted to manager of the northeast division of Schlumberger Well Surveying Corporation. New district managers are **T. C. Nichols** at New Iberia, Louisiana; **G. F. Chambliss** at Cortez, Colorado; **George Broussard** at Franklin, Louisiana, and **J. M. Price** at Ardmore, Oklahoma.

S. S. Smith has been named Canadian regional sales manager of the pumping unit division for The Parkersburg Rig and Reel Company. He succeeds **J. L. Norris** who has been transferred to Oklahoma City, Oklahoma, as district sales manager for pumping units.

Melvin A. Hendrickson is now sales manager for pipe protection products, electrical products divison of Minnesota Mining & Manufacturing Co.

Robert M. Erskine is the new manager of D+B sales for Continental-Emsco Company. He will direct the sales of D+B subsurface equipment.

R. M. Erskine

W. J. Harkey

H. L. Johnson

W. J. Harkey and **Harry L. Johnson** are now vice presidents of National Geophysical Company, Inc. Johnson is in charge of the Houston office and Harkey is located in Dallas where National maintains its headquarters.

With openings of headquarters in Caracas, Venezuela, **Sam C. Welker** has been named manager of Security Engineering Division's South American activities.

Robert F. Lane has been promoted to executive vice president of Fischer & Porter Co. Formerly he was assistant to the president.

William E. Mullestein is now vice president-administration of Lukens Steel Company. His former position was general manager of sales.

A new firm, **Gordon R. King,** consulting engineer, with offices in Amarillo, Texas, offers services which include mechanical design, preparation of construction drawings, bills of material and complete specifications requisite to petroleum or petrochemical installations.

New RIDGID

4PJ Geared Threader is now *JAM-PROOF

*Automatically Stops Threading After Standard Length Thread Is Cut

Power drive threading is safe and easy with this new 4PJ—no more watching of either die stock or drive! 4PJ can't jam—drive pinion kicks out automatically after full thread is cut. Extra-easy to handle . . . mistake-proof workholder, no bushings . . . fully enclosed gears . . . RIDGID most-for-your-money—Buy new 4PJ at your Supply House!

RIDGID 400A Power Drive with Universal Drive Shaft operates 4PJ Threader on 2½" to 4" pipe held in Tristand Chain Vise, all RIDGID products.

The Ridge Tool Company, Elyria, Ohio, U.S.A.

RIDGID Work-Saver Pipe Tools

Trade Parade

Samuel S. Auchincloss has been elected president and chairman of the board of Tracerlab, Inc. succeeding **William O. Faxon,** who has resigned as president and will continue as a consultant.

Three West Coast industrial leaders have been elected to the board of directors of Stanford Research Institute. They are **Edgar F. Kaiser,** president of Kaiser Industries Corp.; **Dr. Arnold O. Beckman,** president of Beckman Instruments, Inc. and **William G. Reed,** chairman of the board of the Simpson Logging Co.

In connection with the recent consolidation of two divisions of Great Lakes Carbon Corporation into the newly-organized Mining and Mineral Products Division, **G. A. Russell,** formerly general sales manager of the Dicalite Division, has been designated general sales consultant until his retirement on October 1, 1957. Also, **E. J. Manion,** formerly assistant general sales manager, Dicalite Division, has been promoted to general sales manager of the newly-organized Mining and Mineral Products Division and **Gordon G. Halvorsen,** formerly district sales manager, Dicalite Division, has been promoted to assistant general sales manager, Mining and Mineral Products Division.

A new post of general sales manager and three new regional sales headquarters have been established by Mason-Neilan, Division of Worthington Corporation. **A. Blair Powell** is general sales manager of the Mason-Neilan Division. **Warren F. Priest** is eastern regional manager, **E. Putnam Head** has become southeastern regional manager and **Alex M. Thackara** is West Coast regional manager.

Hardest job abroad? "Learning to spell the name of a Mexican community in which I was stationed," says J. D. Thornton, "It was at Coatzacoalcos." R. G. Kelly, senior vice president, looks on as Ralph R. Emery (left), vice president of foreign operations and export sales, presents Thornton with a 20-year pin, honoring his two decades with Halliburton Oil Well Cementing Company.

Alfred G. deMeurisse has been named New York district sales manager of the chemical division of General Mills.

Ray D. MacMahon, former general staff supervisor, industrial and commercial sales, for the Southern California Gas Company, has been named sales manager of the Steam Generator Division of the Clayton Manufacturing Company.

W. Roy Widdoes has become assistant to the president of Lukens Steel Company and **W. Harrison Lackey** the new general manager of sales. Both men are members of the company's management committee.

William M. Hawkins Jr. is now sales manager of the Electronic Industries Division, Consolidated Electrodynamics Corporation.

Clyde M. Lackey is now domestic sales manager for Cardwell Manufacturing Company. He was formerly district manager in the Illinois Basin.

H. E. Burtner is a new area sales manager for Charles Wheatley Company, with headquarters in Lafayette, Louisiana.

Earl G. Hoff has been promoted to chief engineer in charge of engineering for Walker Well Heads, Inc.

S. E. Allen has been advanced to vice president and general manager of all company operations and **W. M. Broxham** to vice president and general manager of the plate and alloy products division, Graver Tank and Mfg. Co., Inc.

B. H. Pickard has been elected president and **B. G. Price** vice president of engineering research and development and assistant general manager of the Tuboscope Company.

Pat Loper is now advertising manager for the Brown Oil Tool Company. **Frank Smith** has replaced Loper as sales engineer for the Gulf Coast.

The Parsons Company, a division of Koehring Company, has appointed four district sales representatives whose areas will embrace all 48 states. They are **Eugene H. Nelson, Robert J. Arbs, Russell J. Dye,** and **John J. Harvey.**

WHEELING
COUPLINGS
FOR OIL COUNTRY USE
LINE PIPE COUPLINGS A.P.I.
1/8" to 12" — Seamless — Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
1" to 4" — Seamless
EXTERNAL UPSET TUBING COUPLINGS A.P.I.
3/4" to 3 1/2" — Seamless
CASING COUPLINGS A.P.I.
4 1/2" to 13 3/8" — Seamless — Long or Short
HYDRAULIC COUPLINGS
1/8" to 4" — Seamless
REAMED AND DRIFTED A.I.S.I.
3/4" to 12" — Seamless
DRIVE PIPE COUPLINGS
6" to 12" — Seamless
Sales Offices in Leading Cities:
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—James W. Fankhanel, 2301 No. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Detroit, Mich.—R. W. Lang, Jr., 505 Park Avenue
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Grand Rapids, Mich.—R. W. Lang, Jr., 138 Burton SE
Houston, Texas—Henry H. Paris Distributor, Inc., Box 932
Independence, Mo.—Craig A. Fross, 3701 Norwood
Los Angeles, Cal.—James A. Riordan Co., 1400 Santa Fe Avenue
Louisville, Ky.—Sid. Schultze Co., 514 W. Main St.
Milwaukee, Wis.—W. G. Nelson, 3347 N. 97th St.
Norberth, Pa.—J. W. Worthington, 105 Forrest Ave.
Newark, N. J.—Ira L. Rothenberg & Assocs., 398 Market St.
New York, N. Y.—Max Rothenberg, 11-05 38th Ave., Long Island City
Omaha, Neb.—Wm. Freiden, Central States Engineering & Sales Co., 5101 Blondo St.
Oswego, N. Y.—Northeastern Associates, Inc., Neil Chatterton, Secretary, P. O. Box 284
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
St. Louis, Mo.—Walter C. Dollinger Co., 4869 Goodfellow St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
TOP QUALITY Since 1918
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

E. R. Shrader succeeds **W. J. Alexander,** former advertising manager of Johnson Pump Company, who has been appointed sales promotion manager of Continental-Emsco Company. Both companies are divisions of The Youngstown Sheet and Tube Company.

William V. Crowley has been named sales manager for the western division of ALWAC Corporation. He will supervise sales and marketing activities.

Cecil Wooten has been appointed managing director of Chicago Bridge Limited, London, England. Since 1952 Wooten had been with the export department in New York.

Charles R. Shumate has been appointed sales representative in the Dallas-Fort Worth district for W-K-M gate valves, Division of ACF Industries, Incorporated.

William E. Glidden, formerly founder and president of Glidden Coating Co., has become associated with Metalweld, Inc., Protective Coatings Division.

Clarence H. Mingle, vice president of Gates Rubber Company, has become director of marketing for the organization. In this newly created position he will be responsible for the coordination and direction of all sales divisions.

John M. Miner has been elected president of Petro-Tech Service, C. A., a member of Dresser Industries, Inc.

J. S. Morgan has been appointed director of domestic sales for Allis-Chalmers Industries Group. He will be responsible for the administration and activities of the field sales organization.

Herman Gottwald and **Donald C. Morgan** have been named assistant vice presidents and product managers of Rockwell Manufacturing Company's Meter and Valve Division. **Robert A. Johnson** succeeds Gottwald as eastern regional sales manager. Succeeding Morgan as central regional sales manager is **Thomas O. Carson.**

Herman Gottwald

D. C. Morgan

Six new appointments have been made by Mason Neilan, division of Worthington Corporation. **Robert O. Smith** moves into the position of New York district manager and **Robert Nickerson** moves from headquarters to the Chicago office. In addition, **Allan Gilchrist, John Mattes Jr., Harry Mattes** and **David Willardson** have been added to the sales engineer staff.

A. R. Kratzberg, formerly general superintendent, has been named manager of Fluor Products Company's metal fabrication division.

James C. Cameron has been named to the newly created post of manager of market research for Wolverine Tube, Division of Calumet & Hecla, Inc.

H. S. Cain has been appointed district sales engineer for Berry Hydraulics, a division of Oliver Tyrone Corporation.

Reece Hatchitt has been elected to the presidency of Dresser A. G., European affiliate of Dresser Industries, Inc. **Dr. Hans Berger** of Zurich, Switzerland, president of Dresser A. G. since its original formation in 1952, has been elected chairman of the board of Dresser A. G.

James A. Farley has been named field sales manager of Commercial Solvents Corporation.

N. M. Reiners has been named vice president-research for Cummins Engine Company, Inc.

Wilbur M. Tomlinson has been appointed sales manager of the Kansas City, Missouri, territory of Universal Atlas Cement Company, a subsidiary of U. S. Steel Corporation.

Elgen Corporation has promoted **L. C. Harper** to district manager of its offices in Perryton, Texas; **Walker Paine** to district manager in Tyler, Texas; **Max L. Mitchell** to district manager in Seymour, Texas, and **John Yerger** to district manager in Shreveport, Louisiana.

Philip H. McLaughlin has been appointed manager of sales administration at the New York office of Stauffer Chemical Company. McLaughlin will be in charge of product managers, sales development and the scheduling department of the industrial chemical division.

new efficiency and corrosion resistance in . . .

SALT WATER DISPOSAL

and WATER FLOODING

Line Scale

VALVES and SEATS!

Engineered for long service, Line Scale Valves and Seats are ideal for all reciprocating pumps . . . regardless of size, age or model . . . in Bronze and Stainless steel, they meet every need at pressures up to 1,500 P. S. I. and temperatures up to 300° F. Special sizes on request.

- **Nylon Plate**—Insures long life in all fluids, except Phenol, Formic Acid or Concentrated Mineral Acids.
- **Cone Type Spring**—Fully corrosion resistant; cone construction lengthens life of spring, eliminates coil wear.
- **Double Seating Area**—Seating on shoulder and outer rim provides greater seating area and less deformation area.
- **Reversible Valve Plate**—Offers a bonus of double valve life.
- **Quick Change**—Keeper and retainer design provides quick change of spring or valve without use of any tools.
- **Light Action**—Increases pump efficiency.

See your supply dealer

Pipelines and Refineries Also Depend on.....

NEW 1957 CATALOG AVAILABLE!

Send for YOUR Copy . . . TODAY!

Line Scale COMPANY, INC.

3734 S. High St.
Oklahoma City, Oklahoma

Trade Parade

J. Robert Roe has been named sales manager of the commercial-industrial sales division, Kellogg Switchboard and Supply Company, Chicago, Illinois, a division of International Telephone and Telegraph Corporation. He will be responsible for the distribution of Kellogg intercommunication and sound equipment.

William K. Garms has been appointed chief engineer of Jones & Laughlin Supply Division's production equipment sales section.

Black, Sivalls & Bryson, Inc. has promoted **Edwin A. Rhodes** to the newly-created position of technical service, low temperature separation.

Black, Sivalls & Bryson, Ltd. has created two new sales divisions with **George C. Smale** manager of the Saskatchewan division and **Bob Conn** manager of the Alberta division. The Alberta division has been divided into two districts with **Delbert P. Smith** manager of the Calgary district and **Gordon Hougestol** manager of the Edmonton district.

James L. Wilson has been appointed sales service representative for Rector Well Equipment Company, Inc.

Levingston Shipbuilding Company has promoted **W. E. Pennington** to the post of executive vice president.

I. G. Alley has been promoted to fishing tool supervisor for Houston Oil Field Material Company, Inc. and **Nash Campise** is now technical consultant and plant manager.

Eugene Sinnett has been appointed general manager of the Corrulux Division of the L.O.F. Glass Fibers Company. **James L. Neill,** formerly division comptroller, succeeds Sinnett as plant manager, and **George N. Sadorf,** assistant division comptroller, becomes comptroller.

The election of **David R. Breien** as vice president-comptroller of The Lummus Company has been announced. Other elections include **M. J. Marchione,** treasurer, and **C. Frank Corbin,** assistant secretary. Breien, in addition to his new post, retains the position of company secretary.

V. L. Greedy has been appointed sales manager for Pipe Linings, Inc.

Milton Rex Wingard has been appointed vice president-technical director and was elected to the board of directors of Davidson-Kennedy Associates Company.

M. R. Wingard

Roy Gee

Roy Gee is new Venezuelan operations manager for Cia. Halliburton de Cementacion y Fomento, South American subsidiary of Halliburton Oil Well Cementing Company.

Clarence A. Hubert, formerly manager of engineering for International Harvester Company's farm tractor division, is now general manager of the company's construction equipment division.

Don R. Johnson, formerly a storeman at Hobbs, New Mexico, has been appointed manager of the Jones & Laughlin Supply Division store at Sundown, Texas, West Texas district. **Arthur C. Davis** has been promoted from storeman to assistant local store manager at the firm's Houston, Texas, store in the South Texas district.

NEWS NOTES

RAPID GROWTH AND DEVELOPment of welding technology will carry welding industry sales over the billion-dollar mark before 1960, reported J. H. Humberstone, president of Air Reduction Sales Company in a keynote address delivered at a welding conference in Fort Belvoir, Virginia.

CONSTRUCTION WILL START ON a new addition to The Foxboro Company's instrument manufacturing plant at Foxboro, Massachusetts. New structure, adjoining the present instrument assembly building, will expand production capacity 50 percent.

ATLAS EXPLORATION CO., HOUSton, Texas, has changed its name to Atlas Laboratories, Incorporated, to reflect more accurately the nature of the company's activities.

GRANT OIL TOOL COMPANY HAS broken ground for an extensive enlargement of its main plant and offices in Los Angeles, California.

BOTANY MILLS, INC. HAS ACquired all the capital stock of United Supply and Manufacturing Co., Inc. from Graham-Paige Corporation.

SOUTHWEST INDUSTRIES, INC. has begun construction on new manufacturing facilities in Houston, Texas, which will include a 30,000 sq ft shop building and office structure in the Lumpkin Industrial District.

COMMERCIAL SOLVENTS CORPOration stockholders have approved the merger of Thermatomic Carbon Company into CSC.

Industry News

Pipe Coating Plant Opened

The first major plant in the Southeast to apply high-quality coating and wrapping to gas and gasoline transmission pipe has been opened. Southern Pipe Coating Company now occupies a 17-acre, $300,000 plant just completed in Doraville, Georgia. J. C. Matthews is sales manager. Features of the plant are its completely automatic handling of pipe and the 17-acres of storage for bare pipe. It is designed to process 12 miles of pipe a day.

Hardy-Griffin Corp. Purchased

Purchase of Hardy-Griffin Engineering Corp. by Atlas Pipe, Inc. has been announced. Both companies will continue to operate under their individual names and no changes in either personnel or products are contemplated. Subject to approval by Hardy-Griffin stockholders, and appropriate governmental agencies, the purchasing arrangement provides that Atlas Pipe, Inc. will buy all the assets of Hardy-Griffin Engineering.

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9' to 22'.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal... Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue... true airfoil blade sections assure maximum air delivery... adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6707 Scott Street, Baltimore 3, Maryland.

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Engineered Products Sold with Service

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Trade Parade

Graver Celebrates 100th Year

Graver Tank & Mfg. Co., Inc. is celebrating its 100th anniversary this year. The company has grown from an organization that employed only the two Graver brothers, who founded the firm, to the more than 4,000 people employed today in plants and divisions across the country. Willard M. Broxham, Graver vice president and centennial chairman, announced that Graver will offer prizes for information as follows: Where is the oldest Graver tank still in use; who has the oldest picture of a Graver tank, and the best idea of decoration of a Graver tank or tanks (either in existence or planned).

Hagan Acquires Bradford Labs

Hagan Chemicals & Controls, Inc., Pittsburgh, Pennsylvania, has acquired Bradford Laboratories, Inc., which will function as a department of the Hall Laboratories division of Hagan. Move marks an expansion of Hall industrial water service into the increasingly important use of water flooding for the recovery of petroleum. With laboratories previously established in Bradford, Pennsylvania, and Evansville, Indiana, the new subsidiary recently opened another branch laboratory in Huntington, West Virginia. Further expansion is planned.

Union Carbide Changes Name

The name of Union Carbide and Carbon Corporation has been shortened to Union Carbide Corporation. Names of three divisions of Union Carbide have also been changed. Carbide and Carbon Chemicals Company has become Union Carbide Chemicals Company; Linde Air Products Company is changing its name to Linde Company, and Carbide and Carbon Realty Company will be known as Union Carbide Realty Company.

Research Center Underway

Construction of a research center at Wilton, Connecticut, by Escambia Chemical Corporation is now underway. New center's work will include research activities in petrochemicals, the plastics industry and in related fields. Dr. N. C. Robertson will be in charge of the center.

Rental Firm to Expand

Arnold Pipe Rentals Company, Inc., will expand operations into South Louisiana and offshore in the near future. Fish Northwest Constructors, Inc., recently acquired 80 percent interest in the Arnold company and plans to purchase additional pipe and equipment as well as established new service locations. When expansion is completed, the equipment rental firm will have a multi-million dollar inventory available for the oil and gas drilling industry.

New Plant Aids Industry

Plastic Applicators' new Odessa, Texas, plant will produce baked-on plastic-coated tubular goods for the oil and gas production areas of West Texas and New Mexico. Plant is expected to answer a long-felt need for a modern baked-on plastic-coating center in this area. Robert C. Booth is general manager and Vernon Halverson is superintendent. The "Plasticap" process of baked-on plastic coating consists of: Thorough cleaning of the surface of the pipe to be coated; multiple-coat application of phenolic or modified phenolic resins, and curing of the plastic film at carefully controlled oven temperatures. The resulting finish is described as hard, resilient, highly resistant to corrosive well fluids and to the deposition of paraffin in production tubing.

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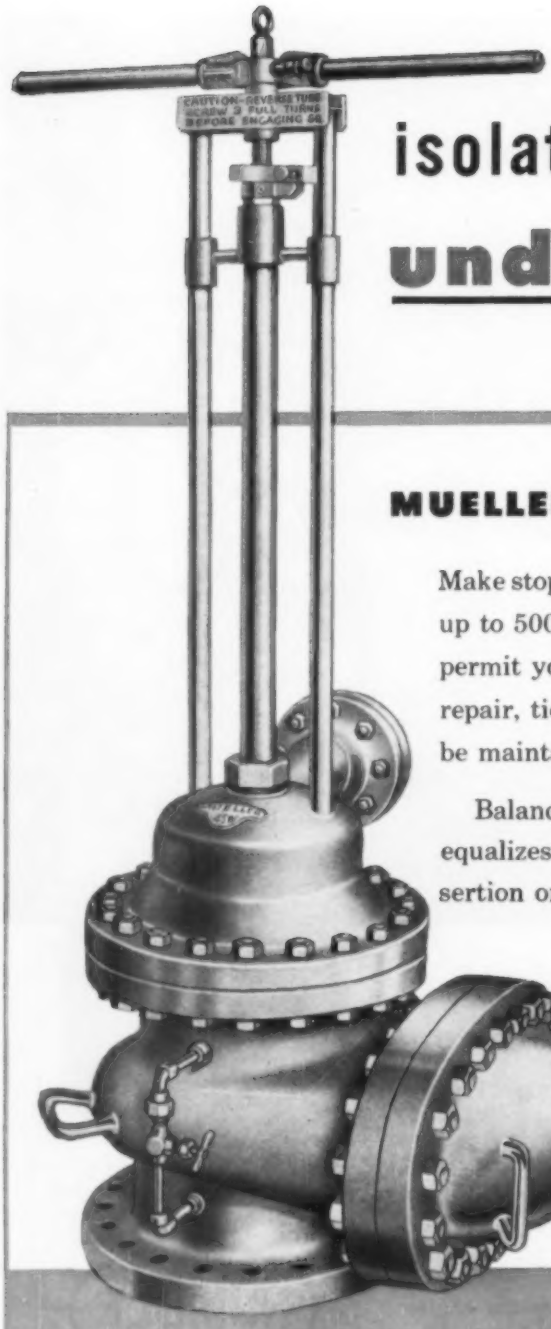

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Make stop-offs on 10" and 12" lines under pressures up to 500 p.s.i. Mueller No. 4 Line Stopper Units permit you to isolate a complete line section for repair, tie-in or relocation. If desired, flow may be maintained, through an independent by-pass.

Balancing pressure valve in completion plug equalizes pressure in fitting, permitting easy insertion or removal of plug.

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Write for complete information on the No. 4 Line Stopper Unit. If you have only a limited amount of work to be done you may be interested in our rental plan.

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YOU'RE UP, Mr. OILMAN!

Here's your chance to make a hit with your friends and neighbors!

Because you are an oilman, all eyes will be on *you* during Oil Progress Week—October 13 to 19. It's the week when oilmen everywhere report to the nation on the progress made in their industry.

Oil Progress Week also gives you a great opportunity to create good public relations in your community for yourself and your industry—and the Oil Information Committee has much to offer to help you.

Here are some suggestions

Attractive, professionally-prepared materials are available for you to use in your community—films and speeches for radio and TV, window posters, exhibits and demonstrations, plus a complete ad mat proof book with ads that *any* oilman can use. This well-rounded community relations program contains everything you'll need to help you win prestige and friends.

One of the best ways to get started is to contact your local Oil Information Committee Chairman. He will help you plan a program that will work for you in your community.

So, team up to make Oil Progress Week —*your week*—a big success. Clip out and mail this coupon today!

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I want to take part in promoting Oil Progress Week in my town. Please send me your *free* booklet explaining Oil Progress Week activities and listing the materials available to me.

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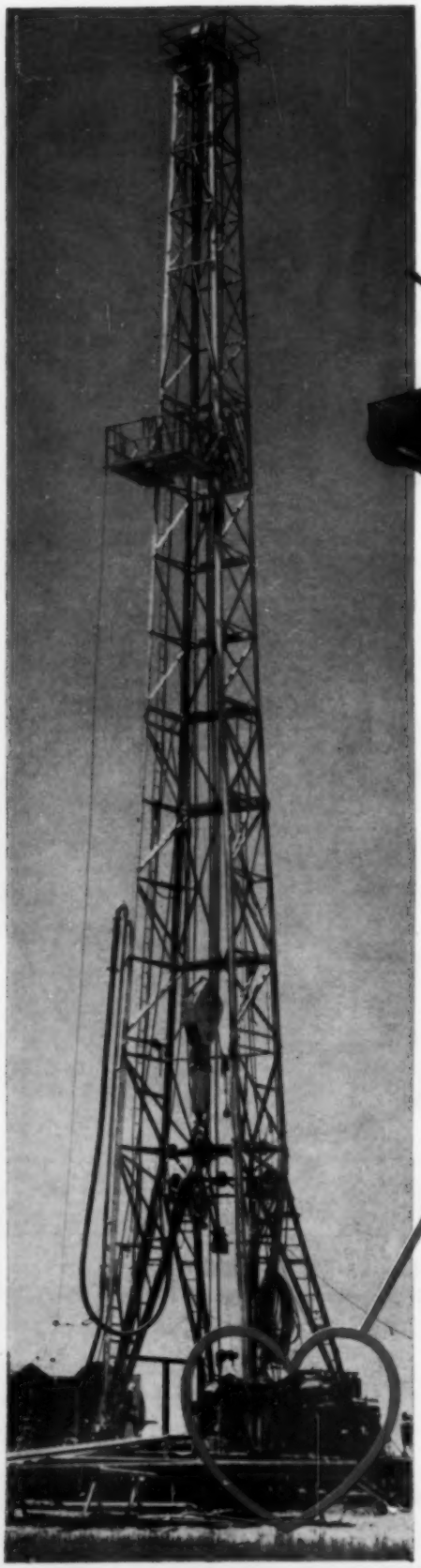

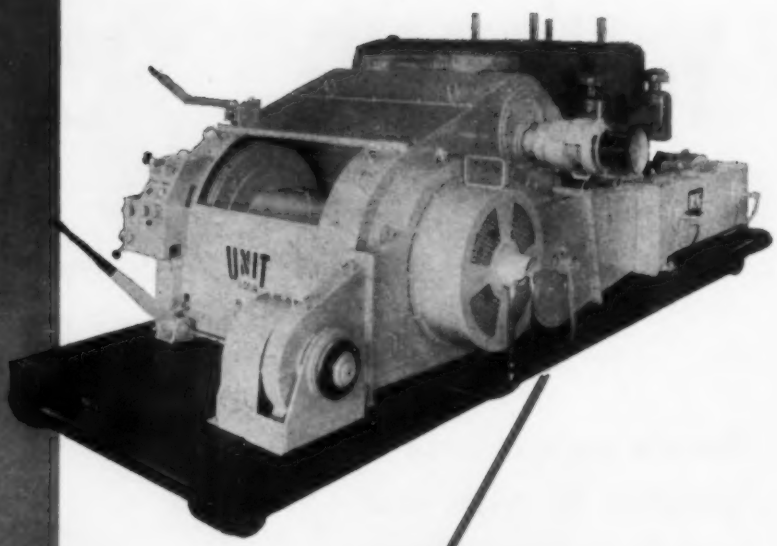

There's ECONOMY at the Heart of this Rig

U-36-A Unit Rig drawworks provides economy because it is engineered for fast drilling, extra depth capacity and convenient rig moves. While rated at 300 to 600 horsepower input, the No. 1 U-36-A, drilling in Wyoming, completed its first field well at 9,243 feet. In the Texas Panhandle, an oil operator using a U-36-A is consistently making hole at record rates. Contractors and oil operators who purchase Unit Rigs regularly get greater dollar value with the extra "built-in" capacities. For complete details on a Unit Rig for your requirements, contact your Mid-Continent representative.

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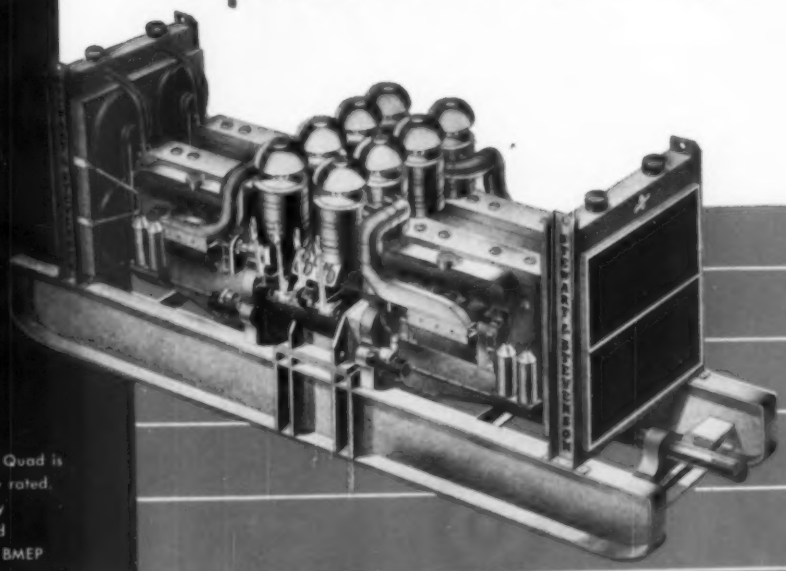
It packs a 1000 H.P. WALLOP!

6-110 QUAD



55% MORE POWER

- Hydraulic actuated disconnect clutches. Power may be taken off either end of the 6-110 Quad. A dual power takeoff arrangement is also available.
- Reduced fuel consumption. The New 6-110 Quad delivers more horsepower per fuel dollar than previous units.
- The 6-110 Quad is conservatively rated. It is naturally aspirated and consequently BMEP and cylinder pressures are low.
- Standard General Motors Diesel Parts in both the gear and engine applications.
- Adapted, developed and guaranteed by Stewart & Stevenson, The Nation's Largest Distributor of Diesel Engines.

This new GM 6-110 Quad, adapted and developed by Stewart & Stevenson, brings to the oil industry a new concept of a compact, high horsepower package at reasonable cost. The new 6-110 Quad develops 880 to 1000 continuous horsepower, or up to 1200 intermittent H.P. It is the largest horsepower engine in its class. It develops more usable horsepower at speeds that are acceptable in more oil field applications than any other engine.

Several years ago, Stewart & Stevenson introduced the Series 6-71 Quad to the oil industry. No other engine unit has ever matched it for service. Now, here is a new, higher horsepower 6-110 Quad with the same characteristics for dependability and performance of the earlier model, *yet with 55% more horsepower.*

The new GM 6-110 Quad by Stewart & Stevenson utilizes approximately 98% standard GM Diesel Engine parts in both the gear and engine applications. It uses tandem twin gear parts in a newly designed and ruggedly built case of welded steel construction, designed especially for the 6-110 Quad application.

The New 6-110 Quad is very compact, and, in most instances, will fit into the same space as the earlier Quad 6-71. This new 6-110 Quad has the lowest unit cost of any diesel engine power arrangement with comparable horsepower.

Please write, phone or call your nearest Stewart & Stevenson Representative or Branch for complete details.

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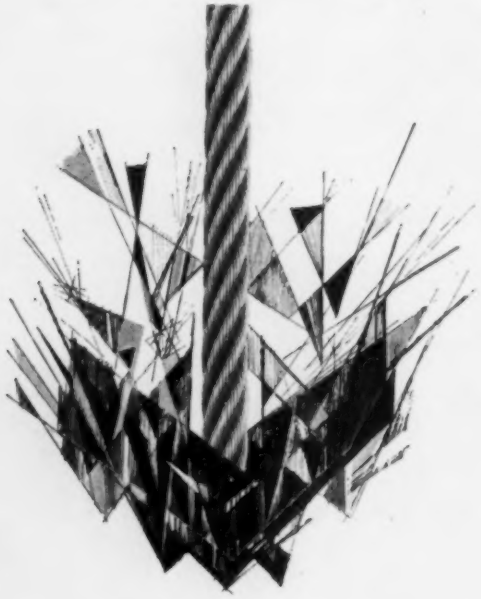

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They all add up to the fact that Roebling Royal Blue will deliver more work on your job—regardless of what it is. It's as simple and money-saving as that. For full information on Royal Blue, the rope that's stronger than yesterday's strongest, talk to your Roebling Distributor or write Wire Rope Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

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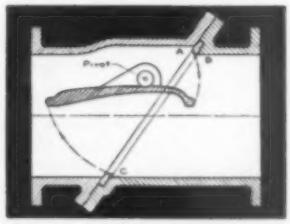
It's the silent valve. No noise, no vibration, no fluttering. On usual piping arrangements you get no slamming with a Chapman Tilting Disc Check Valve. You get no banging to cause damage to system or valve . . . no grinding, scraping or wearing of either the disc or seat. Your maintenance costs go down to an unbelievable low which is really something to see and enjoy.

You can safely use these valves under tough operating conditions. You can order them in iron and steel . . . for handling fluids or gases under a wide range of pressures. You can get them fast. See our Catalog 30-A. Write for your copy today.



Look at this operational chart. When the flow is on, "airfoil" disc is held firmly against stops in the body. When the flow drops, disc balances quietly on whatever flow there is. When flow stops, disc drops quickly, quietly and firmly on special bevel seat. Note that sufficient space is designed around disc to cut down flow resistance.

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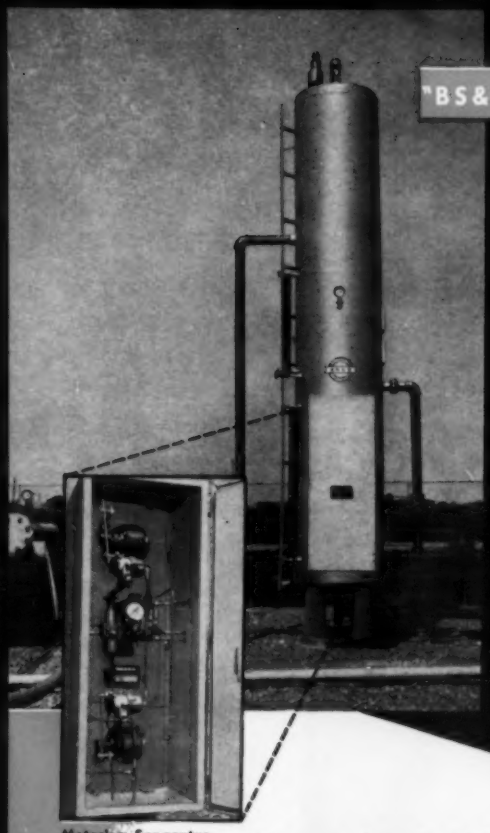
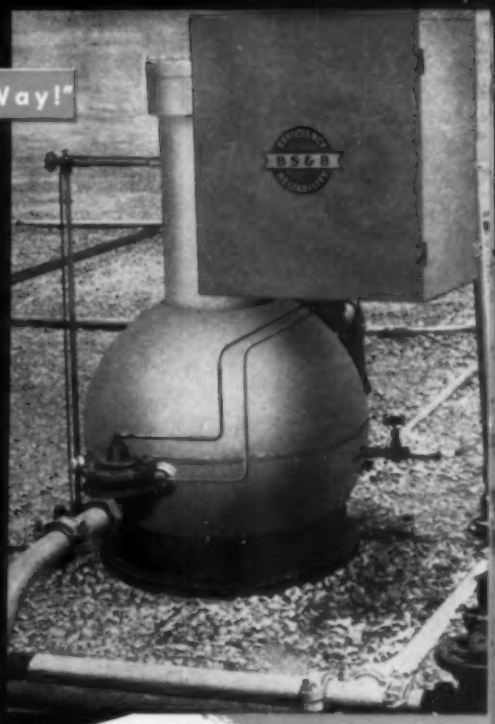
Whatever Your Lease Liquid Metering Requirements



Metering Separator



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There Is A BS&B Metering Chamber, Metering Tank, Metering Treater or Metering Separator For The Job!

For today's rapidly developing trend to oil lease automation, BS&B offers a complete line of fully automatic liquid metering equipment to meet every lease requirement. Any of the following items of equipment may be used independently — or as an integral part of the recently announced new BS&B "PHANTO-MATIC" Lease System:

1. **BS&B VERTICAL VOLUMETRIC METERING SEPARATORS, MODELS D OR E** — Incorporates volumetric dump metering of oil with gas-oil separation.
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OUTSTANDING FEATURES COMMON TO ALL UNITS:

1. Compact in design for easy hook-up.
2. Available with either pneumatic or electro-pneumatic controls.
3. External adjustments on controls can be easily made without shutting in the unit.
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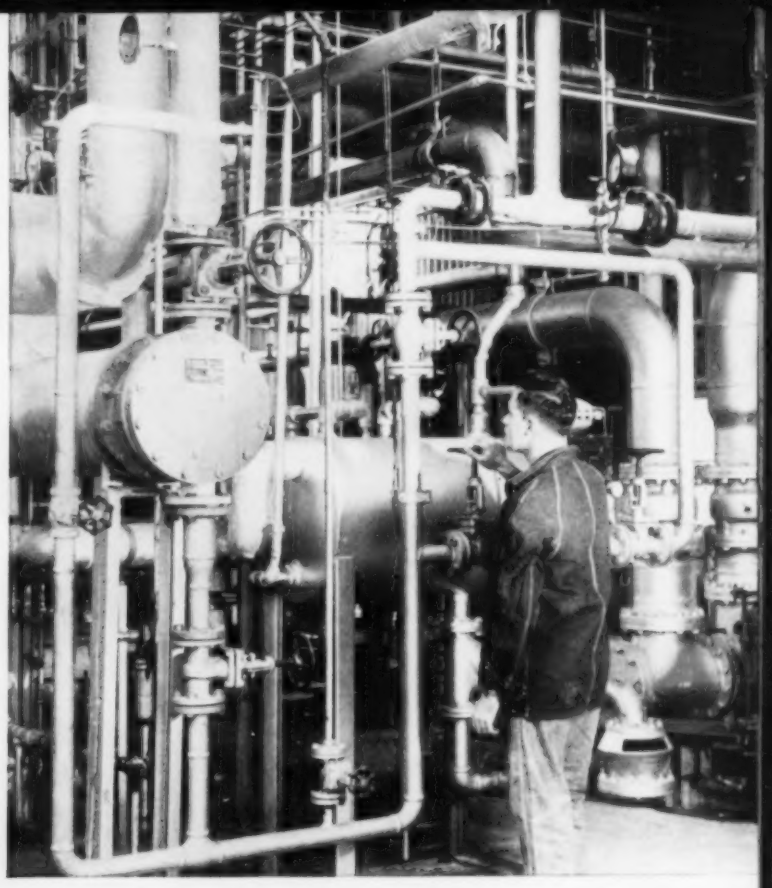

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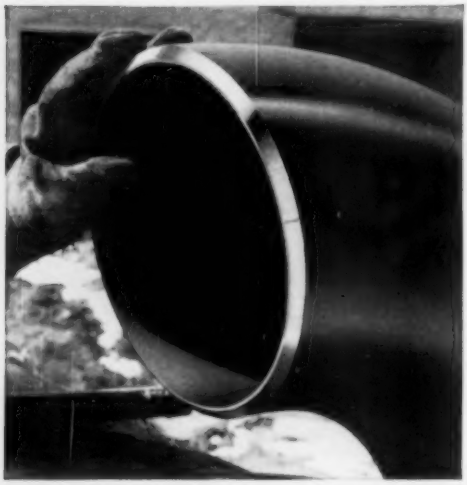

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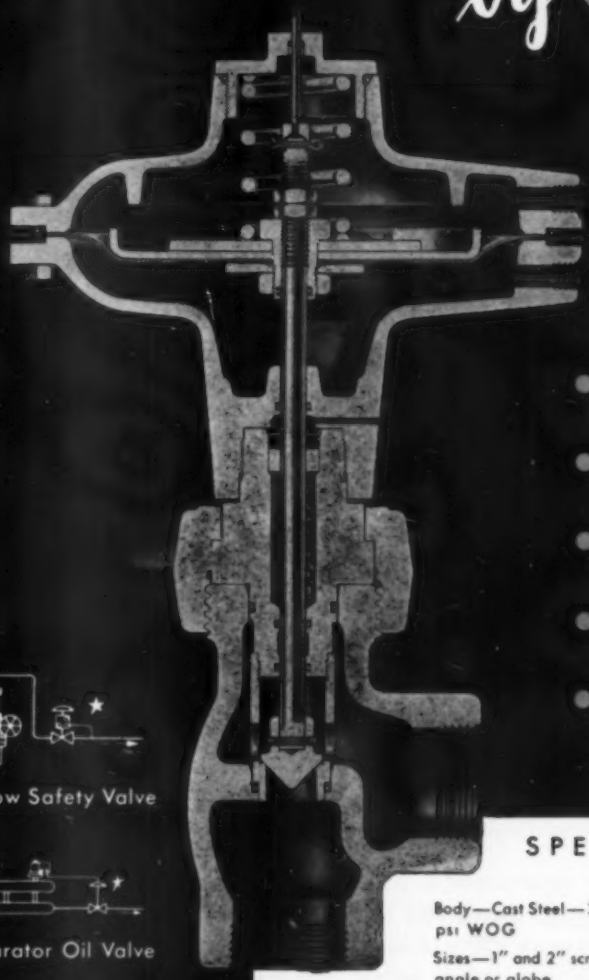
Series 125P

HIGH PRESSURE DIAPHRAGM CONTROL VALVE



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Hi-Low Safety Valve

Separator Oil Valve

Time Cycle Intermitter

SPECIFICATIONS

Body—Cast Steel—2000 psi WOG

Sizes—1" and 2" screwed angle or globe

Orifice Size—1" Body—¼", ⅜", ½", ¾" 2" Body—¼", ⅜", ½", ¾", 1"

Valve Cage—440 hardened St. Steel. (Tungsten carbide insert also available.)

Inner Valve—440 hardened St Steel (Tungsten carbide tip also available.)

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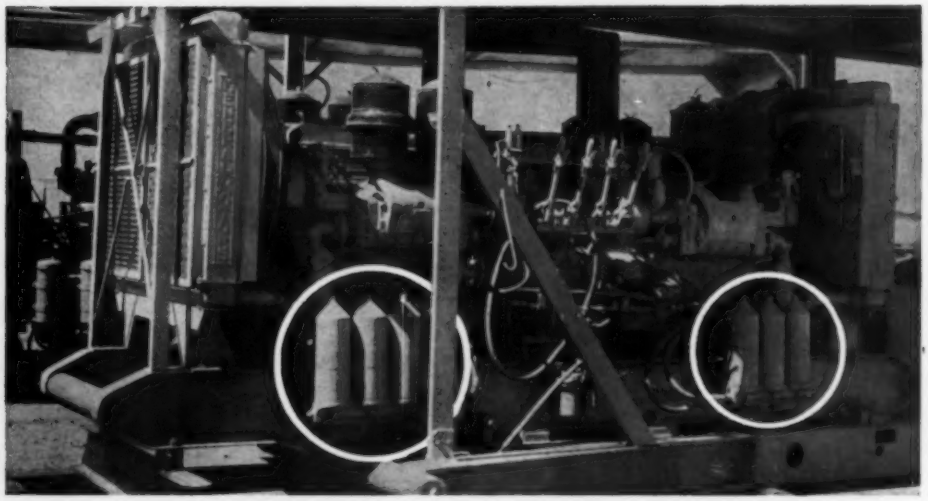

LUBE OIL KEPT CLEAN A MONTH INSTEAD OF A WEEK
with Winslow CP Filters*

Porter-Loughlin Company of Odessa, Texas, one of the largest Texas oil drilling companies, operates many drill rigs. Power for some electric generators is supplied by a quad installation of four 6-71 GM engines. The engines run 24 hours a day—a real tough test on lube oil—on filters and on engines.

With original filter equipment, oil and element changes were made every week. Since the installation of WINSLOW B-74 Full-Flow Filters, with CP* elements, oil and elements are changed only once a month or after 720 operating hours.

That's important in operating costs, and other big savings are longer engine life and lower maintenance cost, with the use of Winslow Filters. Ask about the application of modern CP* filters for all your powered equipment.

CP* FILTRATION

Winslow patented CP* (Controlled Pressure) elements are designed to continuously self-adjust the pressure within the filter and allow for a full stream of filtered oil without opening by-pass valves. This is accomplished through the dual flow capacity, with two types of material in the same element.

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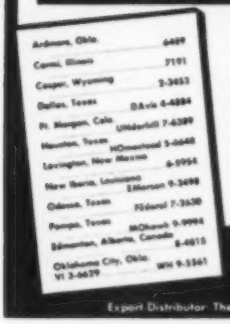

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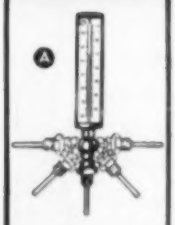

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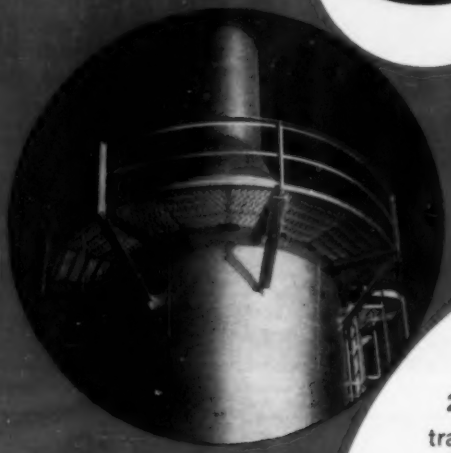
you can judge

the comparative values of furnace design as applied to operating requirements.

It's quite simple

there are **9** basic factors which must be evaluated to obtain the full comparison of values



1—Average radiant transfer rate. **2**—Maximum deviation from average radiant transfer rate. **3**—Average and maximum transfer rate in convection section. **4**—Maximum tube wall temperature, radiant or convection. **5**—Maximum efficiency with specified excess air. **6**—Controlled thermal recirculation of flue gases to provide even heat distribution throughout full length of each tube and equalized heat distribution around each tube. **7**—Overload and corresponding transfer load. **8**—Design to provide: structural column supports · Ladders · Platforms · Tube Removal facilities, etc. **9**—Degree of assembly; of the furnace structure and of the heating surface.

Whenever all these 9 specifications are applied to all the operating requirements, you can be sure PETROCHEM ISOFLOW FURNACES will be found most economically desirable.

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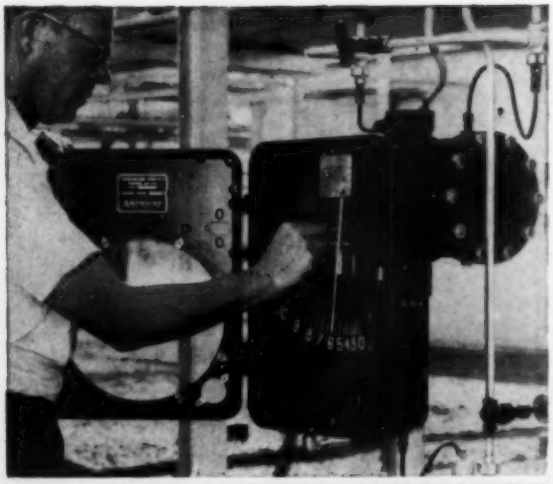

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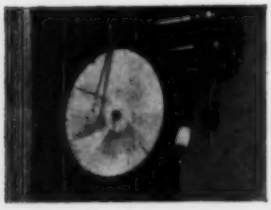
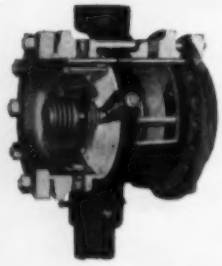
Above, an American DRI-FLO Meter is used to measure ethane reflux flow on a de-ethanizer unit in a gasoline plant at 500 psi and 80 to 100° F, typical of one of the many installations meeting the most exacting requirements.

Below, a DRI-FLO manometer is shown measuring lease gas and is used in conjunction with a 30-year-old recording mechanism — proof of the versatility and long service life built into American products.





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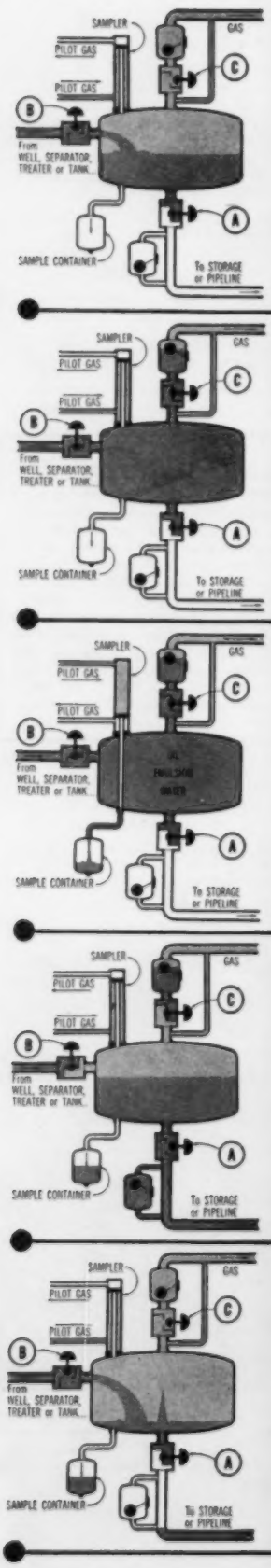

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WITH CORE BARREL SAMPLER

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FOR POSITIVE MEASUREMENT OF LIQUID FROM WELL, SEPARATOR, TREATER OR TANK

The PVM* meter is liquid packed, sampled, and then counted as the liquid is discharged. Its accuracy is indisputable as to volume of liquid measured at the pressure-temperature condition of operation.

A very unique feature is the automatic sampling of each cycle which takes out a core and saves it in a separate container attached so that exact content of BS&W can be determined later.

The PVM may be calibrated for an exact volume with compensation made for a given oil composition, temperature, and pressure.

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The Core Barrel Sampler* used in conjunction with the PVM completes the requirements for metering oil field liquids. The Sampler cuts a core vertically through the liquid and deposits same in a container. Thus an exact and representative core is taken from a fixed volume. The composite sample when analyzed will give the true percentage of oil, water and/or emulsion that has been metered.

**PVM and Core Barrel Sampler are the trademarks of National Tank Company*

- **FILLING** — Valve **A** is closed to retain liquid in metering chamber. Valve **B** is open to admit liquid and Valve **C** is open. The Sample Barrel is up out of the stream.
- **POSITIVE VOLUME ISOLATION** — Valve **A** is still closed; meter fills past Valve **C** which closes. Valve **B** closes, assuring meter to be full of liquid. Note the volume trapped by Valves **A**, **B** and **C** is positive and not affected by float control levels.
- **CORE BARREL SAMPLING OF LIQUID** — Valves **A**, **B** and **C** are closed. Sample tube is driven vertically through the liquid, assuring a representative, proportional sample of the entire content as it exists in the vessel. Sample is discharged to a container for future analysis. Sampler is retracted.
- **DISCHARGING AND RECORDING** — Valve **A** now opens permitting vessel to empty the positive volume. The cycle counter is actuated. Valves **B** and **C** are still closed.
- **VALVES REPOSITION** — Valve **A** closes; Valve **C** is opened, dropping fluid into meter for measurement with next volume and Valve **B** opens for new cycle.

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The unique design of O-C-T Delta Flanges has materially increased the strength and maintenance-free life of dual string trees.

Many dual string trees tend to "Y" out under pressure if they have unbalanced flanges. This stress aggravates leakage problems and often necessitates expensive extra bracing to hold the two strings together.

O-C-T Delta Flanges have solved this problem. The balanced design – plus the Laurent Seal Rings that keep pressure area at a minimum – makes possible a perfectly balanced, leak-free tree with no tendency to "Y" out.

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...gives you 14% Greater Penetration— Debris-Free Perforations

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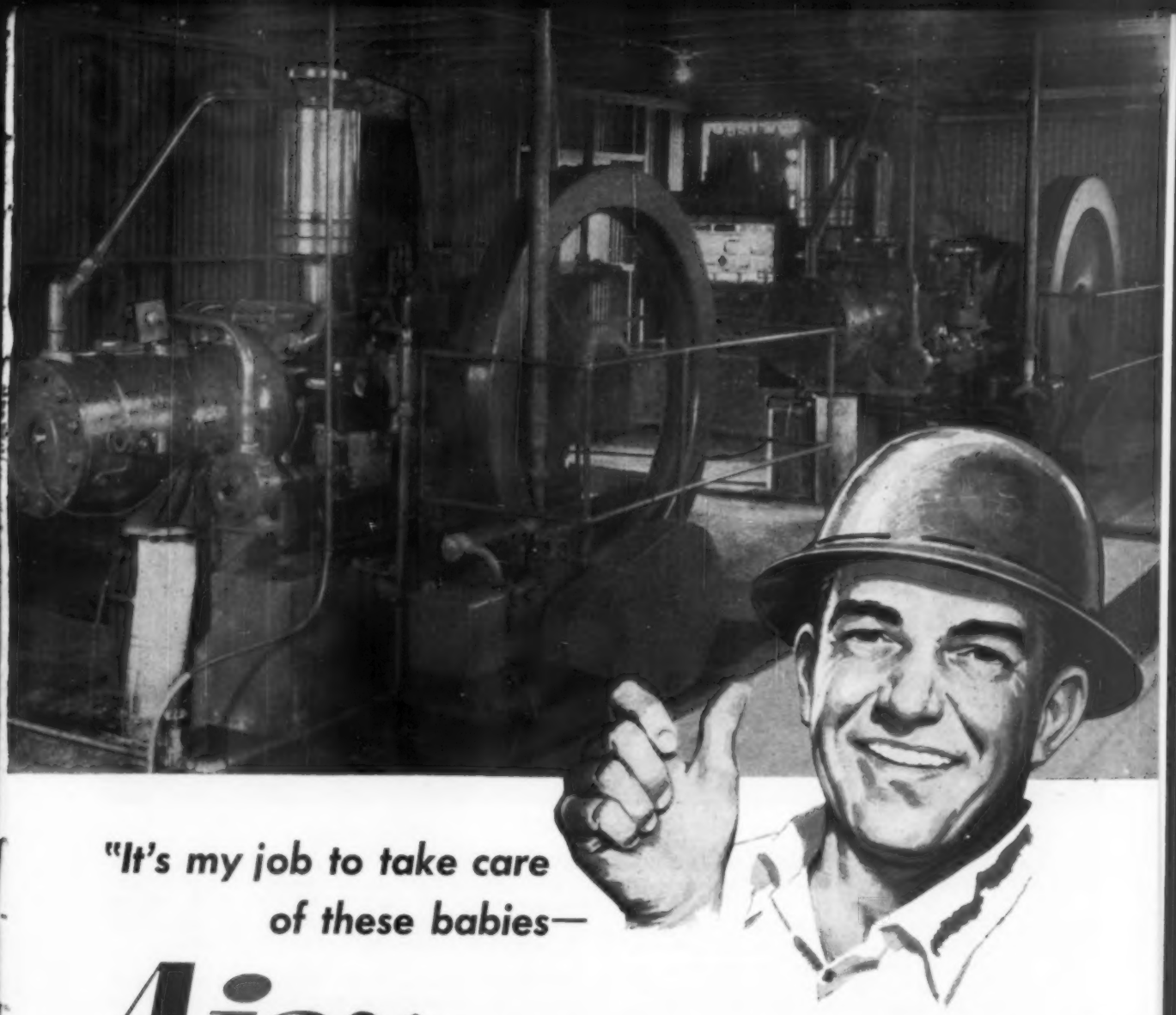

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with longer... smoother strokes

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AXELSON

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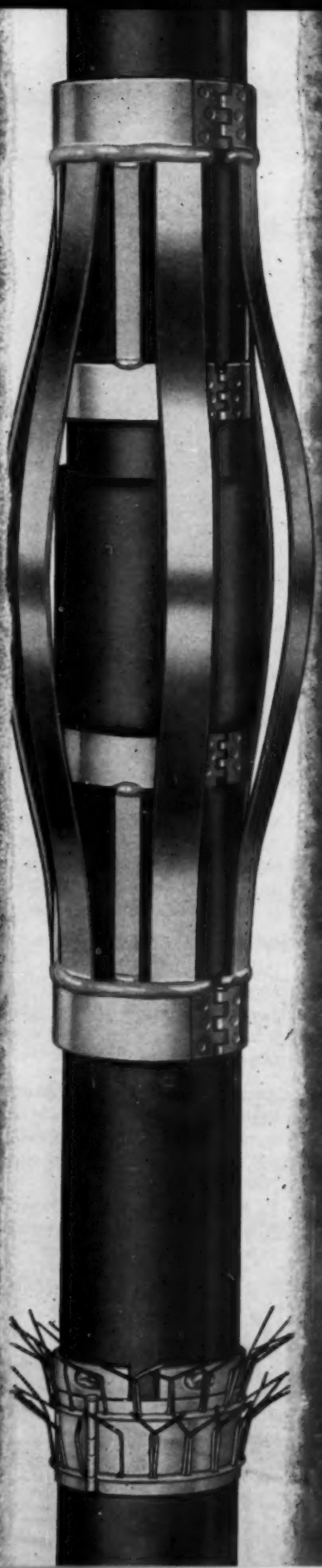

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Model "H-25"
HINGE-LOK
Casing
Centralizer
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NO. 9113

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"G" Casing
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Here's that

Baker Model "C"
HINGE-LOK Wall Scratcher
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25-Range

Baker Model "C"
SOLID RING Wall Scratcher
Product No. 901-C
25-Range

For successful "first-time" cementing use the combination of BAKER CASING CENTRALIZERS to ensure ample clearance for placing a uniform body of cement around the casing—and BAKER WALL SCRATCHERS to scratch away the mud cake so that the cement will bond better with the exposed formation.

YOU MUST HAVE "EFFECTIVE CENTERING FORCE"

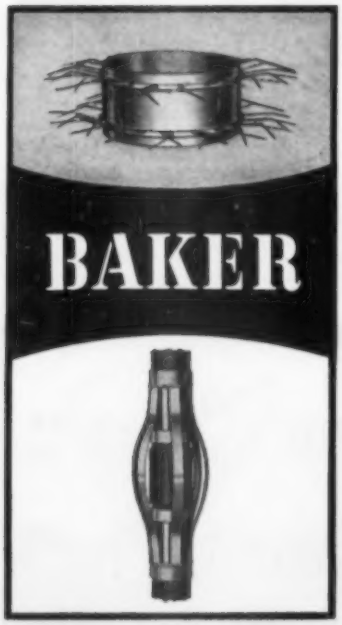
Baker Casing Centralizers have that *balanced combination* of proper spring *length* and proper *bowed height* ("reach") to provide Effective Centering Force *throughout the area to be cemented.* And, because each spring is pre-tested and pre-set in hydraulic presses, you have this Centering Force *at the cementing point,* regardless of depth or of "dog legs" in the hole.

YOU SCRATCH ONLY THE SECTIONS TO BE CEMENTED

Baker Wall Scratchers perform a "controlled" scratching job, because the wires remain close against the casing while running in the hole, and *do not damage the vital filter cake* built up on sections through which the scratchers pass. Only when the "wall scratching" operation is started, do the overlapping wires (positioned in a *double* shell) *really go to work* scratching away the mud sheath and exposing the formation for far better bonding of the cement.

OUTSTANDING COMBINATION

FOR BETTER PRIMARY CEMENTING



Baker Wall Scratchers also meet your specific needs because they are available with either 4½-inch long scratcher wires, or with 2½-inch long wires. You can also select either the HINGE-LOK Type which is hinged for easy mounting, or the SOLID RING Type which is *slipped over the casing.*

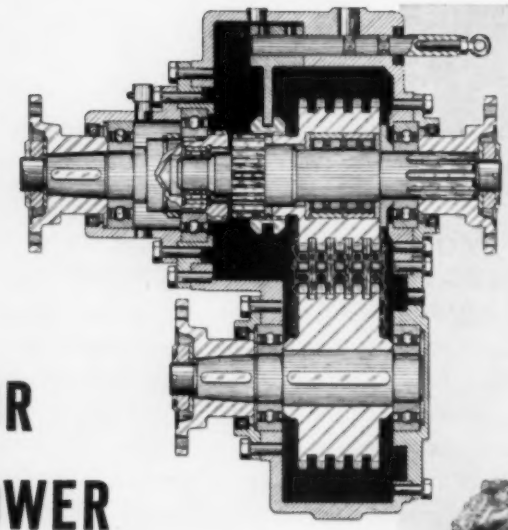
Contact the Baker representative in your area and get complete details about these Baker aids to better cementing. He has first-hand field knowledge that will prove valuable to you.

WALL SCRATCHERS

CASING CENTRALIZERS

You can choose Baker Casing Centralizers exactly suited to each cementing job because they are available with various bowed heights of the springs to meet different casing programs—and there is the Baker Model "H" HINGE-LOK Type which is hinged for easy mounting, or Baker Model "G" SOLID Type which is merely slipped over the casing.

BAKER OIL TOOLS, INC., Houston • Los Angeles • New York



FOR POWER TAKE-OFF... AND CHAIN PULL-DOWN

The George E. Failing CFD-1 Combination Rig is equipped with

DIAMOND ROLLER CHAINS

The method of applying correct drilling pressure is so important in the design of this machine that the *method* has become its *name—Chain Feed Drill.* It is significant that for this vital drive, *Diamond* Roller Chain is first choice.

Like other leaders in the oil field, George E. Failing Co. depends on Diamond Roller Chain's uniform high quality to deliver dependable, long-life, low-cost performance.

Look for Diamond Roller Chain on new equipment and ask for Diamond by name when replacing roller chain in the field. You get more service from Diamond, so it costs less.

DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

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Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND ROLLER CHAINS

Man with an Oil Well on his Mind

SELECT CEMENT TO FIT THE JOB

● Cement men with oil-well cementing problems on their mind . . . continuing laboratory and field research to keep cements abreast of drilling progress...cement production methods which emphasize quality first, last and all the time...

These are the reasons why Lone Star Cements today successfully protect billions of dollars of oil-well investments, standing steadfastly behind millions of feet of pipe, in deep wells and shallow, under just about every conceivable oil-field condition.

Having designed these Oil-Well Cements to meet the entire range of Oil Industry requirements, outstanding performance is assured by continuous checking and re-checking throughout the process of manufacture, in one of the most exacting quality-control procedures in industry today.

Select cement to fit the job: 'INCOR',* America's FIRST High-Early, Sulphate-Resistant Cement...'STARCOR'* Slow-Setting Oil Well Cement...'TEXCOR'* Deep Oil Well Cement...LONE STAR Cement, standard of highest quality for half a century.

*Reg. U.S. Pat. Off.

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OFFICES: DALLAS • HOUSTON • ABILENE, TEX. • LAKE CHARLES, LA. • NEW ORLEANS • KANSAS CITY, MO. • BIRMINGHAM • ALBANY, N. Y. • BETHLEHEM, PA. • BOSTON • CHICAGO • INDIANAPOLIS • NEW YORK • NORFOLK • RICHMOND SEATTLE • WASHINGTON, D. C.

Still on the job after 9 years with

MARVEL INVERSE OILER—

Vital Part of World's Finest Engines

The Marvel Inverse Oiler ⟶

is an integral part of the Waukesha NKRU gas unit. Operating off the intake manifold, this completely automatic Oiler feeds Marvel Mystery Oil exactly in proportion to engine loads . . . gives direct protection to the all-important upper cylinder areas.

STILL ON THE JOB after *nine years'* service! This dependable Waukesha NK Series engine, pictured above, has *never* had the head or pan off in all this time.

Like most fine performers, the Waukesha engine is equipped with a Marvel Inverse Oiler for Marvel Mystery Oil—finest performing lubricant on the market.

For engine manufacturers have found that engines equipped with Marvel Inverse Oilers, can be depended upon to give quick acceleration to save trip time . . . keep operating costs to a minimum . . . guarantee hours of continuous performance . . . keep "down time" low by extending periods between overhauls.

The Marvel Inverse Oiler, incorporated as a vital unit in the engine's lubrication system, feeds Marvel Mystery Oil in exact proportion to engine speed and load . . . properly lubricating valves and guides, preventing wear and sticking. It keeps upper piston rings free in their grooves . . . retards ring flutter . . . and cushions ring pounding which can result in ring breakages.

Of course, it is actually the oil that performs these functions and only Marvel Mystery Oil is blended for this purpose and for the Marvel Inverse Oiler!

Available in Canada through Radiator Specialty Company of Canada Ltd., Toronto 2, Ontario, Canada

EMEROL MFG. CO.

242 West 69th Street New York 23, N. Y

SALVAGE

Means Greater Savings to Users of Christensen Diamond Bits

The *original* Christensen Diamond Bit price is only part of the cost story. The thorough, prompt Christensen salvage process after bit use gives maximum diamond recovery, credited to you, and means lowest possible *net* bit cost. Add to this the proven advantages of Christensen Diamond Bits for coring and drilling, such as shorter drilling time, greater core recovery, reduction of costly round trips and longer life and you have every assurance of operating at "less cost per foot."

For actual performance reports of salvaged bits, turn the page.

Illustration shows used bit ready for immersion in electric acid bath which releases the diamonds from the matrix metal.

Do you have our catalog? Write today for SD-608.

CHRISTENSEN DIAMOND PRODUCTS

LESS COST PER FOOT CHRISTENSEN DIAMOND PRODUCTS

1937 SOUTH 2nd WEST SALT LAKE CITY, UTAH

Diamond recovery rates

vary according to the condition of the used bit returned for salvage. No matter what condition the bit is in, the Christensen salvage process guarantees maximum diamond recovery.

When bit arrives for salvage a permanent tag is secured showing customer name, bit type and number and original carat weight.

Important steps in the salvage process shown here, first the shank is cut from bit crown, bit is immersed in electric acid bath and diamonds drop to bottom of tank.

Suction recovery from tank puts diamond into fine screen containers, then diamonds are meticulously hand sorted from foreign matter, accurately weighed, then credited to the customer.

Salvage reports of 4 different bits from diverse conditions

CORE BIT	5-9/16" x 2¼"
AREA	Sabine Parish, Louisiana
FORMATION	Fredricksburg - Wilcox
BIT PERFORMANCE	254 feet @ 2-8 ft./hr.
BIT CONDITION UPON RETURN FOR SALVAGE:	
EXCELLENT X GOOD FAIR POOR	
PERCENTAGE DIAMOND RECOVERY	59%
ORIGINAL BIT COST	$1674.30
NET BIT COST	$863.40
NET BIT COST PER FOOT	$3.39

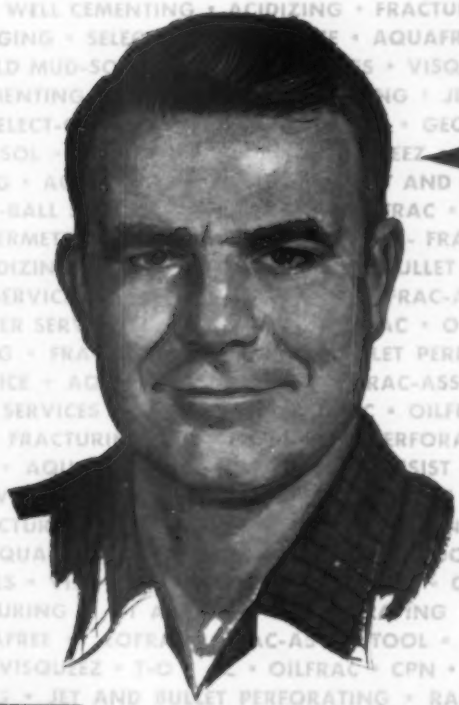
CORE BIT	7⅛" x 3½"
AREA	Wichita County, Texas
FORMATION	Cisco Sand
BIT PERFORMANCE	697 feet @ 6 ft./hr.
BIT CONDITION UPON RETURN FOR SALVAGE:	
EXCELLENT X GOOD FAIR POOR	
PERCENTAGE DIAMOND RECOVERY	63.3%
ORIGINAL BIT COST	$2846.99
NET BIT COST	$1298.94
NET BIT COST PER FOOT	$2.01

CORE BIT	8⅝" x 4"
AREA	Roosevelt County, Montana
FORMATION	Lime, Dolomite
BIT PERFORMANCE	400 feet @ 2-6 ft./hr.
BIT CONDITION UPON RETURN FOR SALVAGE:	
EXCELLENT X GOOD FAIR POOR	
PERCENTAGE DIAMOND RECOVERY	67.3%
ORIGINAL BIT COST	$3788.05
NET BIT COST	$1507.45
NET BIT COST PER FOOT	$3.77

CORE BIT	6¼" x 3½"
AREA	Weld County, Colorado
FORMATION	D & J Sands
BIT PERFORMANCE	407 feet @ 3 ft./hr.
BIT CONDITION UPON RETURN FOR SALVAGE:	
X EXCELLENT GOOD FAIR POOR	
PERCENTAGE DIAMOND RECOVERY	80.2%
ORIGINAL BIT COST	$1500.36
NET BIT COST	$697.11
NET BIT COST PER FOOT	$1.71

1937 South 2nd West Salt Lake City, Utah

CHRISTENSEN DIAMOND PRODUCTS



MEN *make service!*

CHEMICAL PROCESS **W. E. SONNAMAKER**

AND

L. C. HAMILTON BJ Service

MAKE SERVICE TWICE AS GOOD!

Service jobs that start out easy and then suddenly turn rugged make you appreciate men like W. E. "Sonny" Sonnamaker and L. C. "Ham" Hamilton.

Sonny, with Chemical Process, and Ham, with BJ Service, have this in common: a driving desire to give all-out service, on every job, to every customer. When the going gets tough and problem piles on problem, they know how to put together the answers, using guts, experience and the finest facilities in the oil patch.

These outstanding men are very typical of the outstanding companies they represent. Now that they have joined forces it is literally true that they make service *twice* as good—because this great new service combination brings together *twice* the manpower, experience and facilities, for the immediate and continuing benefit of our customers.

Next time you have an oil well service problem, call on the men who make service *twice* as good—the men of BJ Service-Chemical Process.

CHEMICAL PROCESS BJ Service

SUBSIDIARY OF BORG-WARNER CORP.

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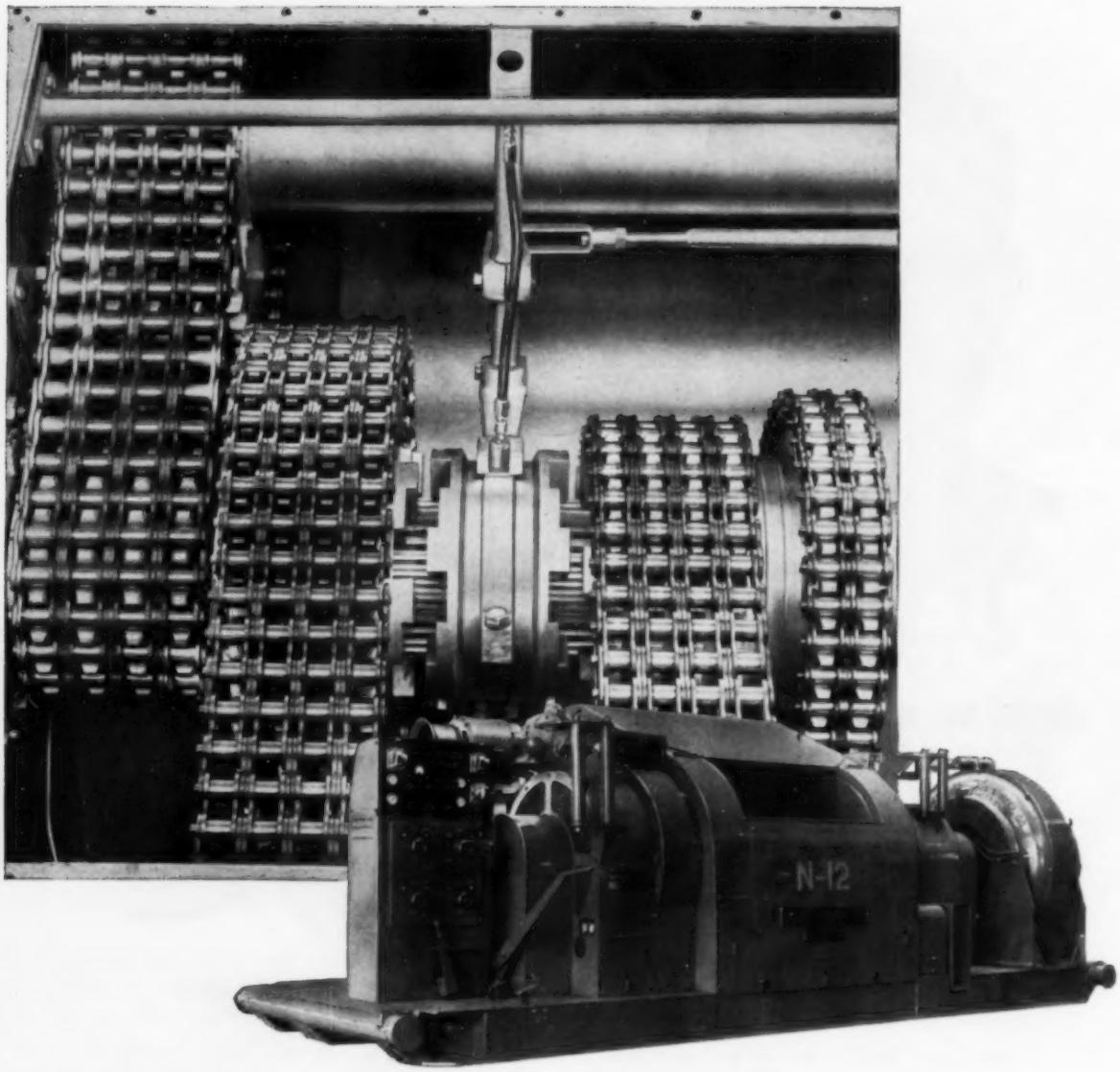
General Offices and Laboratory—Long Beach, California

Stations Throughout California, Rocky Mountain and Permian Basin Areas

Chemical Process

General Offices and Laboratory—Breckenridge, Texas

Stations Throughout the Mid-Continent Area



There's good chain in this Brewster

Brewster chose Rex Chain for this drawworks because Brewster demands standards of performance that Rex is able to meet.

Basically these standards add up to a long life of profitable drilling in an exacting service where profits must be watched closely.

Part of the profit will be realized in the elimination of unnecessary down time. The "glide fit" design of Rex Roller Chain makes assembly and disassembly fast and easy.

More of the profit will be realized from the always continuing program of product improvement which is a CHAIN Belt tradition. There is no roller chain stronger and more resistant to wear and fatigue than today's Rex.

In drilling service, Rex Roller Chain is convenient—enduring—and profitable. See your supply store. CHAIN Belt Company, 4719 West Greenfield Avenue, Milwaukee 1, Wisconsin.

CHAIN BELT COMPANY

Milwaukee 1, Wisconsin

Oil Field Offices: Dallas • Houston • Los Angeles • New York

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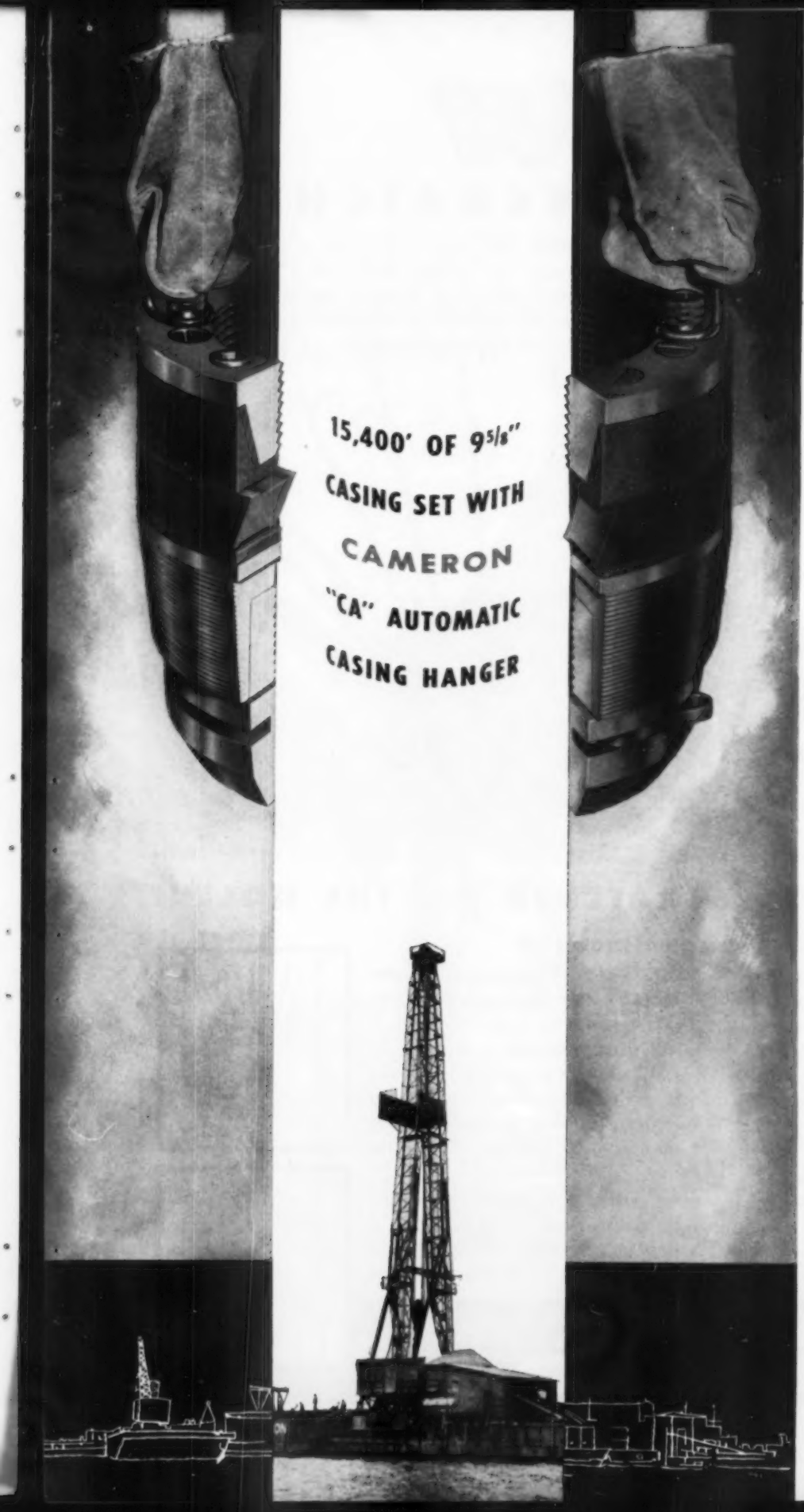

BURTON DRILLING BARGE SETS LONGEST STRING OF CASING

At Lake Palourde in Louisiana a record string of 15,400 feet of 9⅝" N-80 46 lb. casing was successfully set with a Cameron "CA" Automatic Casing Hanger. This is only one of many extreme service installations made with the labor saving, foolproof "CA".

In 1950 Cameron started a research and development program to produce an automatic casing hanger for even greater lengths of pipe. Early in 1956 design features were finally consolidated and test records were set in Cameron's experimental lab which exceeded all expectations. Today these records are being repeated in the field. The "CA" will automatically suspend all anticipated casing lengths without "bottlenecking" at pipe loads equivalent to API joint strength—will seal highest pressures even though casing load may be extremely low. For dependable and instantaneous operation, for any load, light or heavy, at any pressure encountered today, choose the Cameron "CA" Automatic Casing Hanger.

Cameron

IRON WORKS, Inc.

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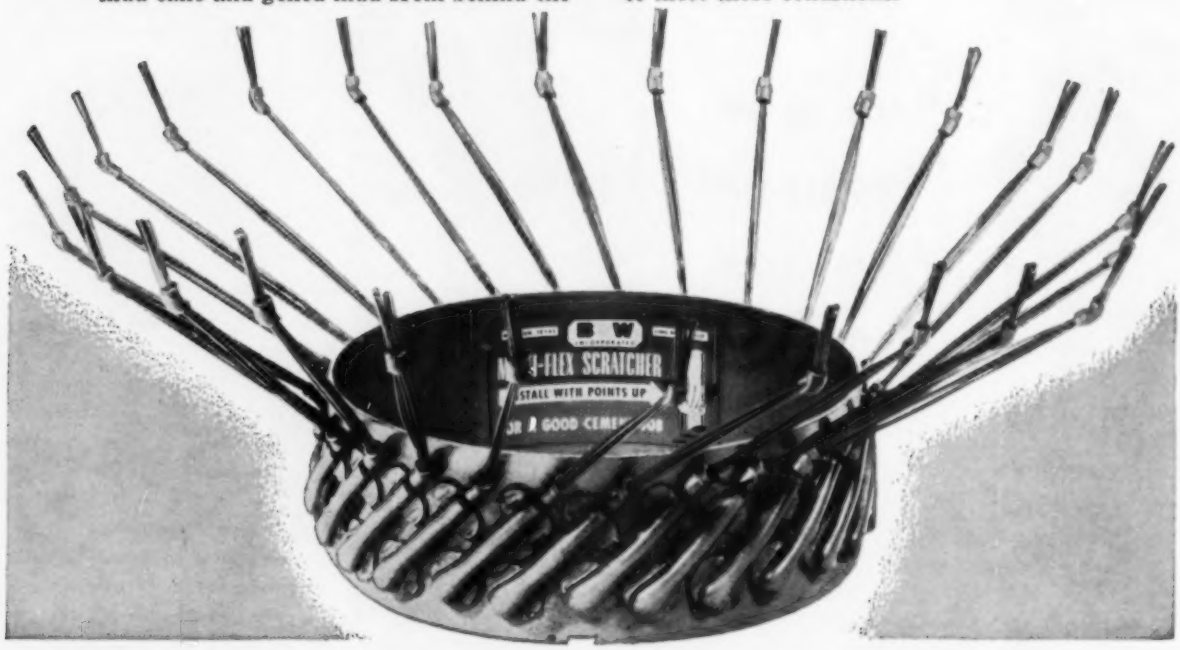
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works, Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

B and W

MULTI-FLEX SCRATCHER

FOR A GOOD CEMENT JOB

B and W, Inc. introduced scratchers to the oil industry in 1940 for the improvement of the primary cement job. Removal of mud cake and gelled mud from behind the casing just as cement slurry is pumped into position is a difficult problem. Well-designed and proven equipment is required to meet these conditions.



"THE EASIEST SCRATCHER ON THE HOLE"

HOW TO JUDGE SCRATCHER PERFORMANCE

BY USAGE—B and W MULTI-FLEX SCRATCHERS have been used in thousands of successful completions.

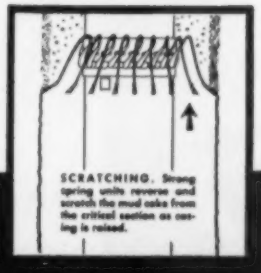
BY ACTUAL OPERATION—When returns from bottom come over the shaker, the amount of filter cake, bit cuttings, and the condition of the return circulation are definite proof of the thoroughness of hole conditioning.

BY RUNNING CASING—The B and W MULTI-FLEX SCRATCHER is the "EASIEST SCRATCHER ON THE HOLE." Condition of the return circulation as casing is run, compared to the amount of mud cake recovered as casing is "worked" on bottom, shows that the upswept multiple wires of the B and W MULTI-FLEX SCRATCHERS remove mud cake only after casing reaches bottom and that hazardous progressive circulation as casing is run is not required.

IN THE TESTING LABORATORY—Testing procedures have been established by B & W, Inc. to determine performance and durability of all types of scratchers. These tests conclusively demonstrate that the B and W MULTI-FLEX SCRATCHER out-performs all others.

BY FIELD TESTS—Under simulated well conditions and in normal installation pattern, the condition of B and W MULTI-FLEX SCRATCHERS, pulled from the test well, shows maximum scratching and durability.

RUNNING IN. Upswept multiple wire spring units protect the mud cake as casing is lowered in well.


SCRATCHING. Strong spring units reverse and scratch the mud cake from the critical section as casing is raised.

GULF COAST
Box 5266
Houston 12, Texas
Phone WA 3-6603

B and W Incorporated
★ *Well Completion Specialists* ★

WEST COAST
19706 S. Normandie Ave.
Torrance, California
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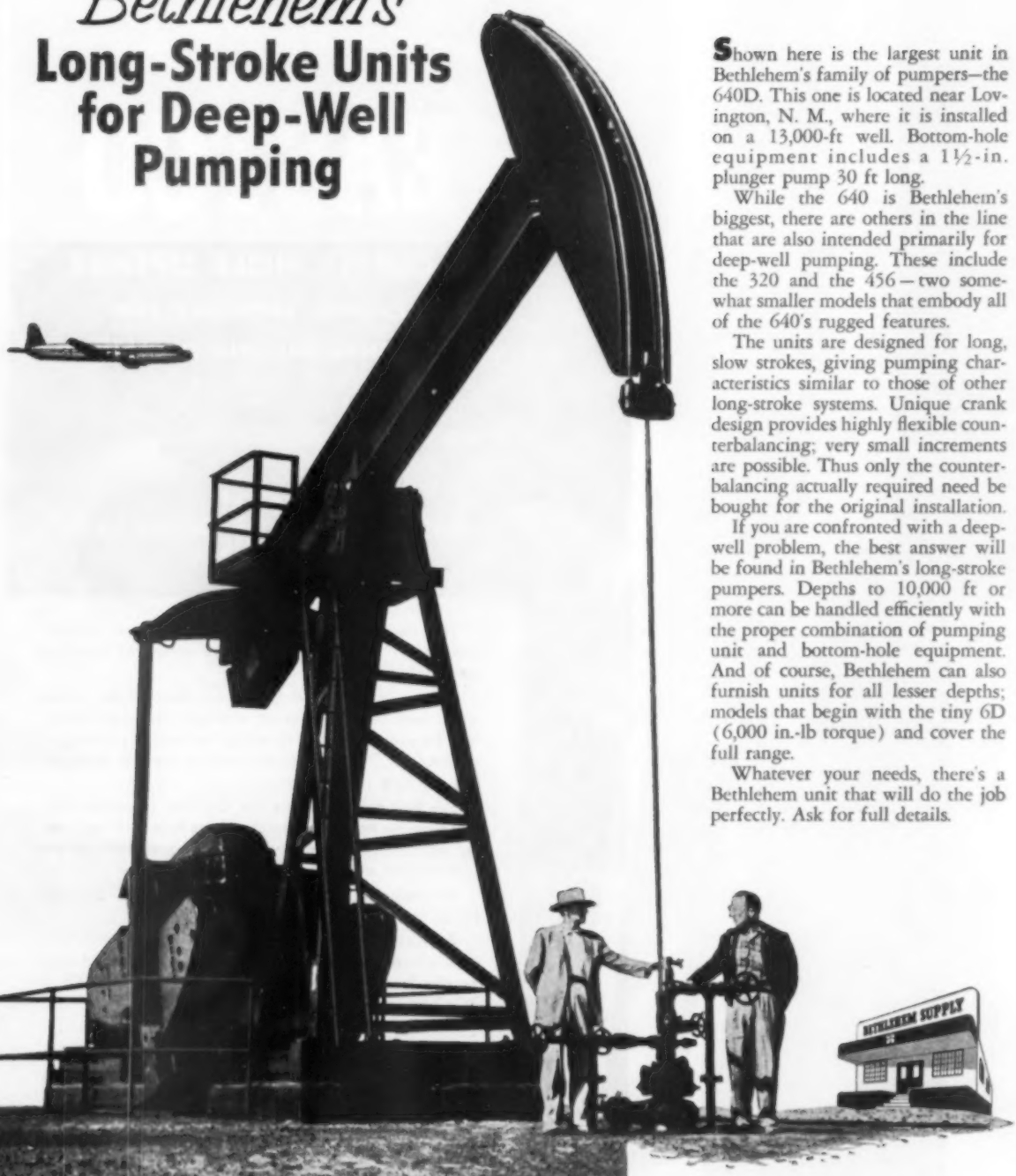
6701

Bethlehem's
Long-Stroke Units for Deep-Well Pumping



Shown here is the largest unit in Bethlehem's family of pumpers—the 640D. This one is located near Lovington, N. M., where it is installed on a 13,000-ft well. Bottom-hole equipment includes a 1½-in. plunger pump 30 ft long.

While the 640 is Bethlehem's biggest, there are others in the line that are also intended primarily for deep-well pumping. These include the 320 and the 456—two somewhat smaller models that embody all of the 640's rugged features.

The units are designed for long, slow strokes, giving pumping characteristics similar to those of other long-stroke systems. Unique crank design provides highly flexible counterbalancing; very small increments are possible. Thus only the counterbalancing actually required need be bought for the original installation.

If you are confronted with a deep-well problem, the best answer will be found in Bethlehem's long-stroke pumpers. Depths to 10,000 ft or more can be handled efficiently with the proper combination of pumping unit and bottom-hole equipment. And of course, Bethlehem can also furnish units for all lesser depths; models that begin with the tiny 6D (6,000 in.-lb torque) and cover the full range.

Whatever your needs, there's a Bethlehem unit that will do the job perfectly. Ask for full details.

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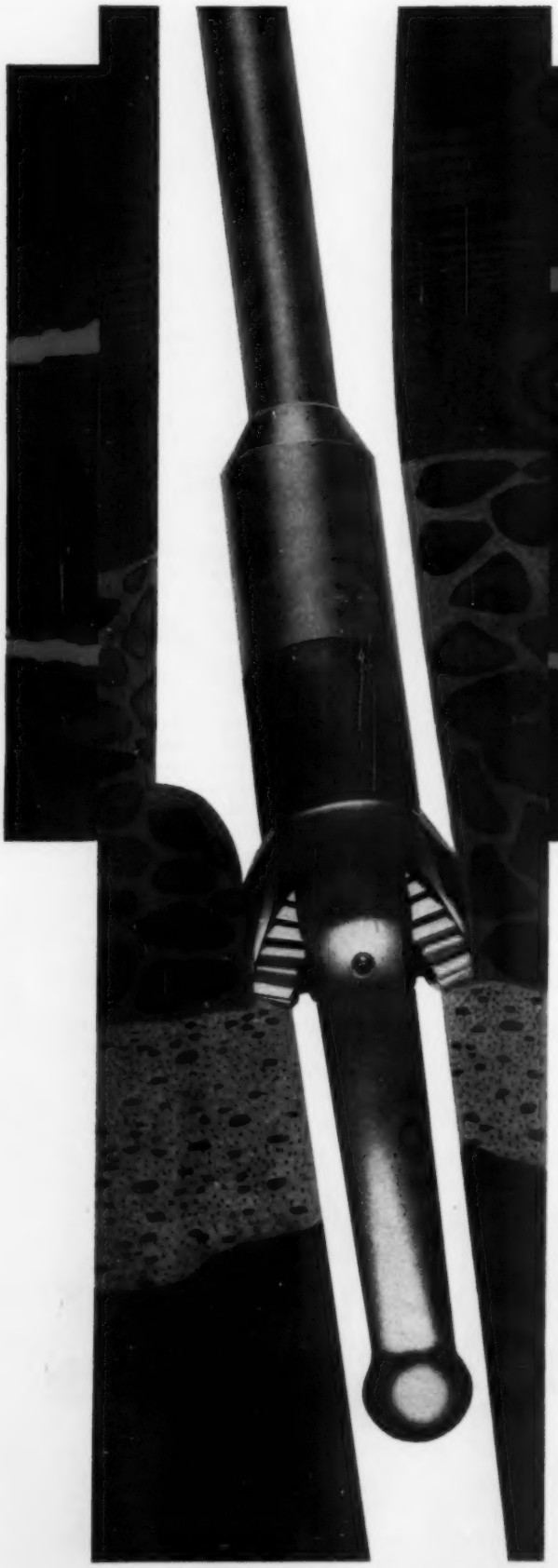


The Best Tool for Reaming Whipstock or Knuckle Joint Pilot Holes to Full Gauge!

EASTCO

2 CUTTER HOLE OPENER

DESIGNED EXPRESSLY FOR DIRECTIONAL DRILLING OPERATIONS

ANOTHER EASTMAN SUPERIOR SERVICE

The best tool for reaming whipstock or knuckle joint pilot holes to full gauge — or for opening core holes!

The body and solid ball guide is a single, nickel alloy steel casting of great strength. The roller bearing 2-cutter assembly is easily and quickly changed on the job. The 2-cutter also allows greater strength. *No welding is necessary.*

The ball guide centers the tool and prevents side-tracking the hole; and the flat sides help find rat hole. Jet action circulation directed ahead of both cutters insures fast efficient operation.

Available in popular size ranges from 6" through 12¼".

So successful and popular has it become that it is now standard equipment throughout the world with hundreds of efficiency-wise operators . . . MAKE IT YOURS!

EASTMAN

EASTMAN OIL WELL SURVEY COMPANY
LONG BEACH DENVER HOUSTON

EASTMAN INTERNATIONAL COMPANY
Exclusive Export Agents
P. O. BOX 1500 DENVER, COLORADO, U.S.A.

announcing the all-new

D&S TRI-DIA diamond core bit!

Relation of bit OD to core barrel OD determines cut-a-way section – not recommended when less than 1⅝".

Check these outstanding features:

- Designed for safety.
- Reduced OD wall contact, similar to Tri-Cone Rock Bit.
- Reduces mud wall cake sticking hazard.
- When making trip, eliminates swabbing – hydraulic action.
- Minimizes junk iron hazard – allows washing out large pieces.
- Readily washes out cavings to bottom.
- Largest measurable diameter materially less than diameter of hole it will cut. (Special Bit Breaker required.)

FOR PEAK PERFORMANCE bit must be designed for each individual job. This information is necessary – (a) type mud, (b) circulation rate, (c) formation and characteristics, (d) rock bit footage, (e) available fluid h.p.

A winning combination:

The revolutionary new D & S Tri-Dia diamond bit, combined with the famous D & S core barrel give coring efficiency PLUS! Rugged core barrel construction and design assure full core recovery. Safety joint, core wedge indicator and fully enclosed lubricated bearings are featured. A minimum of core exposure to fluid circulation eliminates core washing.

WRITE OR CALL TODAY! One of the D & S sales engineers will call on you to show tremendous TRI-DIA Bit and Core Barrel advantages.

TRUCO DIAMOND BITS

Drilling & Service

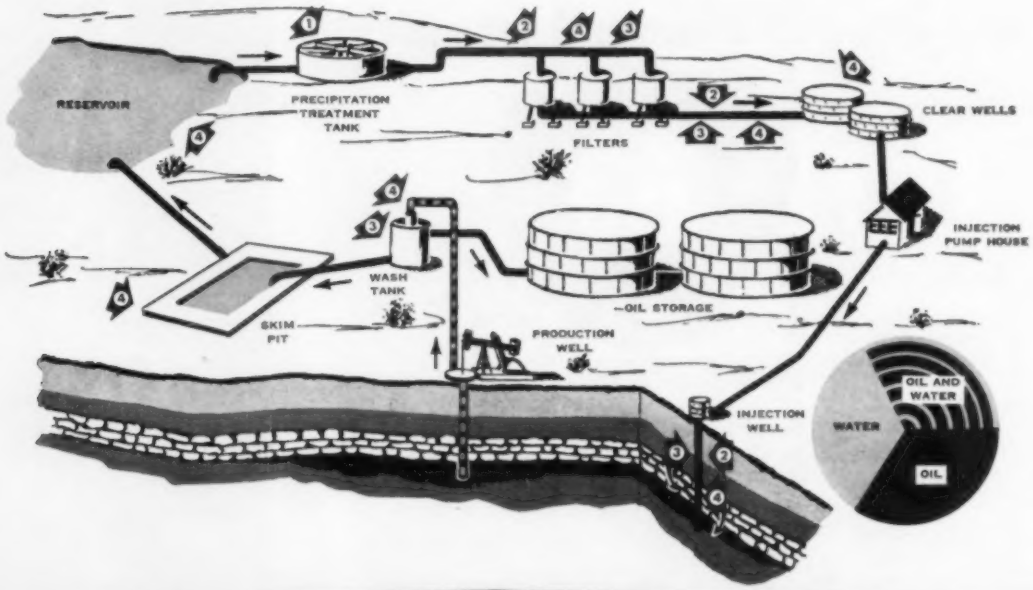
INC. | DIAMOND DRILLING EQUIPMENT

6210 NORTH CENTRAL EXPRESSWAY | DALLAS, TEXAS

OFFICES IN ALL PRINCIPAL OIL AREAS

Ultra Fine Diamond Equipment for the Oilfield

Continuous High Input with *Nalco* Water Flood Treatments



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Clarification of raw water with Nalco coagulants assures better floc formation, faster settling of solids.

2 CORROSION CONTROL
Nalco polyphosphates or organic film forming inhibitors protect pipe lines and equipment against corrosive attack.

3 SCALE PREVENTION
Nalco stabilizing treatments keep scale-forming salts in solution and maintain clean lines and an open formation.

4 MICROBIOLOGICAL CONTROL
Nalco microbiological treatments help maintain clean equipment and an open formation by controlling slime, algae and sulfate reducing bacteria.

Nalco Treatments for water flood operations add up to continuous high input, low pumping costs, elimination of acidizing and back flushing and lower over-all operating and maintenance costs. Check the diagram above for points where the Nalco System works to improve water flood efficiency... Your Nalco Field Service Man will be glad to work with you on any problems you have. His experience is backed by the entire facilities and skills of the world's largest water treatment organization.

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THE *Nalco*® SYSTEM . . . Serving the Petroleum Industry through Practical Applied Science

"Score a TKO AGAINST TIME AND TEMPERATURE

WITH SPERRY-SUN MAGNETIC DIRECTIONAL SURVEYS

When you call for a Sperry-Sun magnetic multishot directional well survey, you get crews trained for efficient operations, using the fastest instrument available and with proven ability to get readings at higher temperatures.

These surveys are made of the uncased portion of the hole, at inclinations from 0° to 90°, on a continuous strip film. Surveys can be made going into or coming out of the hole, either on wire line or drill pipe.

Crews are able to develop, read and compute the survey at the well, with preliminary information available shortly after the instrument is removed from the well.

For your well's safety, call for a Sperry-Sun time-and-temperature-controlled directional survey.

SPERRY-SUN WELL SURVEYING COMPANY

3118 BLODGETT AVENUE • HOUSTON, TEXAS

Sales Offices

Houston, Marshall, Odessa, Wichita Falls and Corpus Christi, Texas; Lafayette, New Orleans, La.; Oklahoma City, Okla.; Casper, Wyoming; Long Beach, Bakersfield and Ventura, Calif.

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For Complete Production Harmony Go

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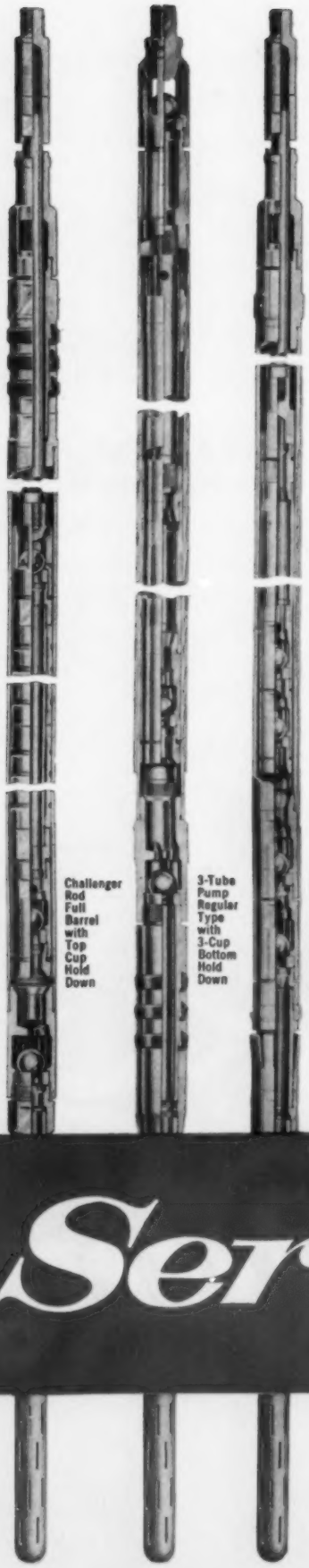

TYPE 5
Heavy Duty • Medium C

There's a
D+B SUBSURFACE PUMP
to fit every well conditio

Continental-Emsco *MAKES, SELLS* and *SERVICES* D+B pumps . . pumps that stay longer on production, even unde the most severe field conditions . . lift more fluid at less cost D+B pumps are more API than all others and are put together in the most modern pump sho in the world . . by men who know pumps best. They're available in a complete range of sizes . . 37 types with over 700 variations.

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TYPE 5
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, even under
ns . . lift
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Heavy Loads • Heavy Corrosion

HEATREAT #1 C M
Medium Duty • Minimum Corrosion

You can't buy a better sucker rod than D+B

D+B sucker rods are *MADE* and *SOLD* and *SERVICED* by Continental-Emsco. There are four grades to meet every pumping need . . from light through heavy corrosive conditions . . made extra tough with extra strength for extra long trouble-free runs. They're *priced right* . . always available *faster* because Continental-Emsco's service is *world-wide, specialized, complete.*

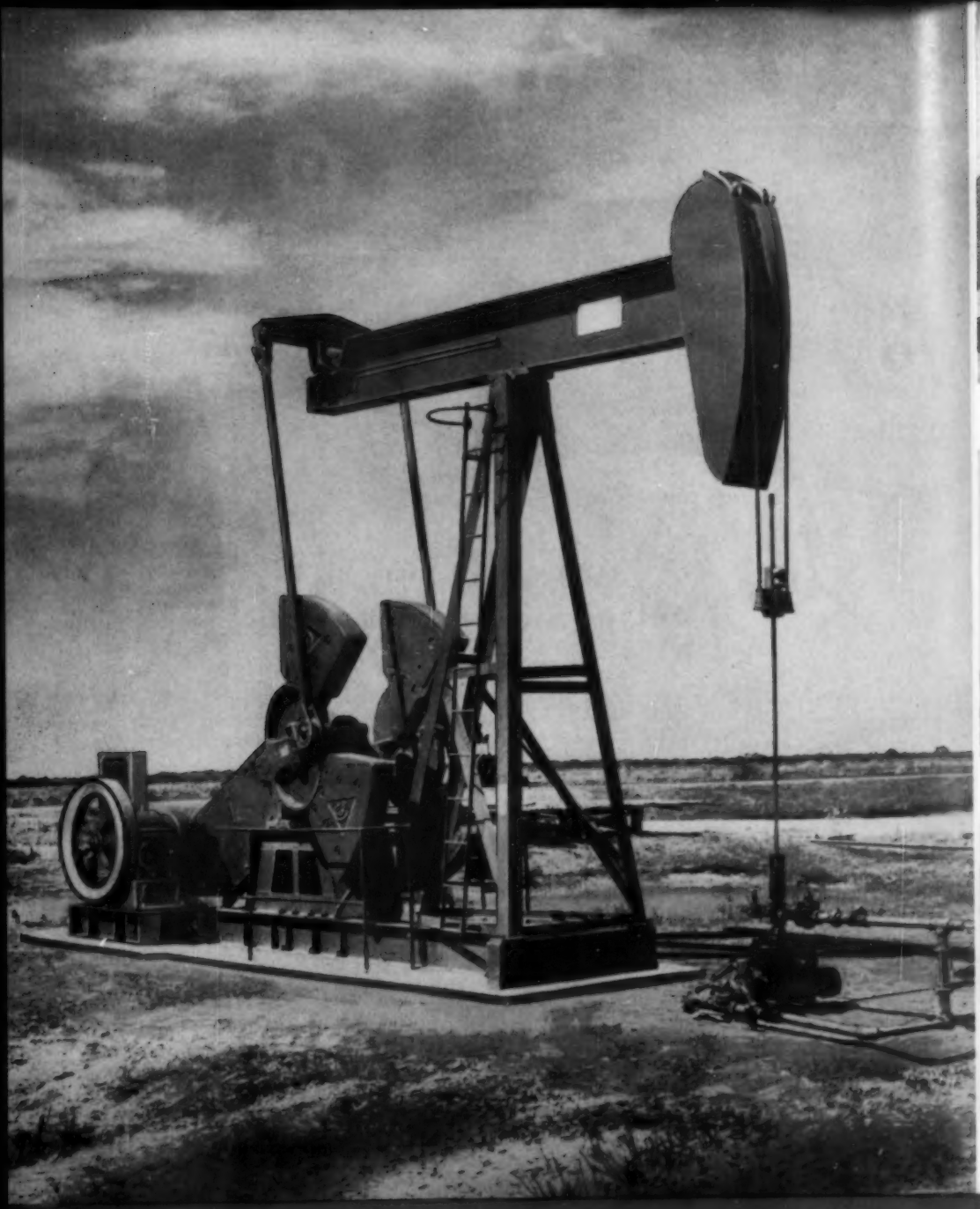
D+B DUAL-PAC STUFFING BOX permits re-packing without killing the well.

D+B QUIK-GRIP CLAMPS eliminate "knuckle-busting"—designed for one-man installation.

D+B API POLISHED RODS made from carefully selected materials in 5 types to meet every well condition.

that Sings..

O STOP PROBLEMS BEFORE THEY START



Step 1. W
bolt . . w

Step 2. D
vertical

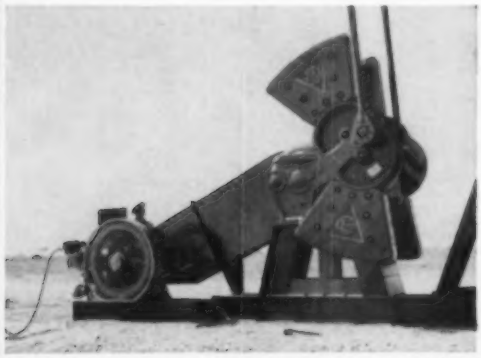
Step 3.
position

Equipment

Lift Page
for Subsurface
Equipment

ENGINEERED . . N

Step 1. With lower weight 15° off vertical . . loosen clamping bolt . . weight swings to vertical . . then tighten bolts.



Step 2. Disengage service brake . . stop other weight 15° off vertical . . loosen clamping bolts and tighten as in Step 1.

Step 3. Repeat operation until weights are swung into desired position.

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Not just built . . but *engineered* for smooth, sure operation, for rugged endurance. Counterbalances are *one-man adjustable* . . in three easy, safe steps . . *all at ground level.* Anti-friction bearings throughout . . precision-cut herringbone gears with rigid case . . automatic lubrication at all speeds, with labyrinth type oil seals that can never wear out. Here's the pumping unit engineered for long, dependable operation with minimum upkeep. Available in a wide variety of sizes and modifications for heavy, medium and light loads.

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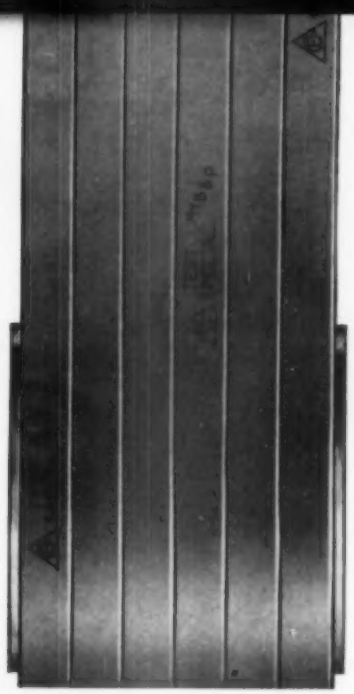
. NOT JUST BUILT



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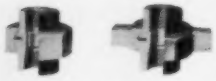

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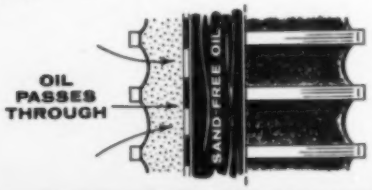

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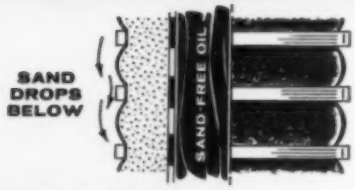

REJECTS SAND on the down-stroke

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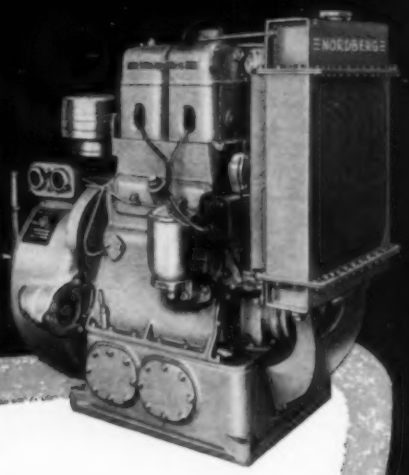

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If you have not received your copy of our 8-page pamphlet on McCullough Radiation Well Logger, just write McCullough Tool Company, 5820 South Alameda Street, Los Angeles 58, California. We'll send your copy by return mail.

Four Wells Logged and Perforated in 12 Hours

Operator of this Arkansas lease required that all four wells in the project be logged and perforated in one daylight operation.

Average depth of operation was 2200'. Wells were cased with 4½" O.D. 9.5 lb. cemented casing. A portable mast was used on each job. Wells were approximately three miles apart.

McCullough Gamma Ray, Neutron and Collar Logs were run, obtaining 800' of 5" scale then dropping back to bottom and logging to surface on 2" scale.

From 12' to 17' of zone was perforated in each well using 3½" O.D. McCullough 30-shot M-3 Guns. A Total of 378 improved ½" Ogival Bullets were fired in the four wells.

Logging and perforating the four-well project required 12 hours, starting at 7:00 A.M. and finishing at 7:00 P.M. Operator was well pleased with speed, efficiency, trouble-free operations, and completion of the job in the allotted time.

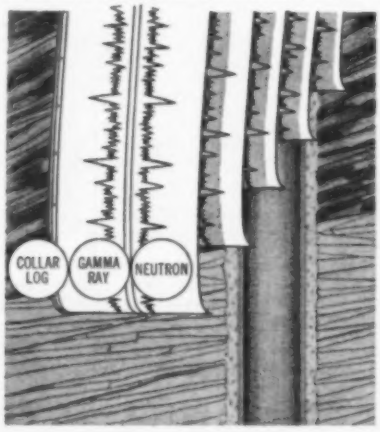
Tough Well Successfully Logged by McCullough

Electric Logs Not Informative – McCullough Radioactivity Log Proves Accurate and Reliable Despite High Pressure and Temperature, Shale Content of Formation and Chemical Mud

A fine example of the efficiency of McCullough's Radiation Well Logger in obtaining reliable and informative logs was recently reported from one of the Mountain States.

This was a wildcat well, drilled to a total depth of 16,500 feet. 5½" O.D. 15½, 18 and 24 lb. casing had been set and cemented to total depth. Bottom hole temperature was 300°. Formation to be tested was the Mesa Verde which is very shaley throughout the Rocky Mountain area.

Two different types of electric logs had been run in open hole by another service company. Neither had proved of value in providing accurate formation information due to high pressures, shale content of the formation and chemical content of the drilling fluid.



Accurate, Clear, Detailed, REPEATABLE Gamma Ray and Neutron Curves

Stability is an important characteristic of McCullough's Radiation Well Logger with Scintillation Counter. It will faithfully duplicate results when run repeatedly under identical conditions.

After casing was set McCullough ran a combination Gamma Ray, Neutron and Collar Log over the bottom 6,500 feet of hole. Actual logging time from start of in-hole log to top of out-hole log was six hours.

The resulting log proved very stable over the entire period of operation. From it, McCullough's Logging Engineer and oil company engineers pin-pointed the formations to be perforated, determined porosities and obtained an accurate sand count. Also, the log accurately correlated with drilling measurements and casing collar locations.

The operator was very satisfied with the successful results of the logging operation.

The jobs described above are certified to be true field reports of services rendered.

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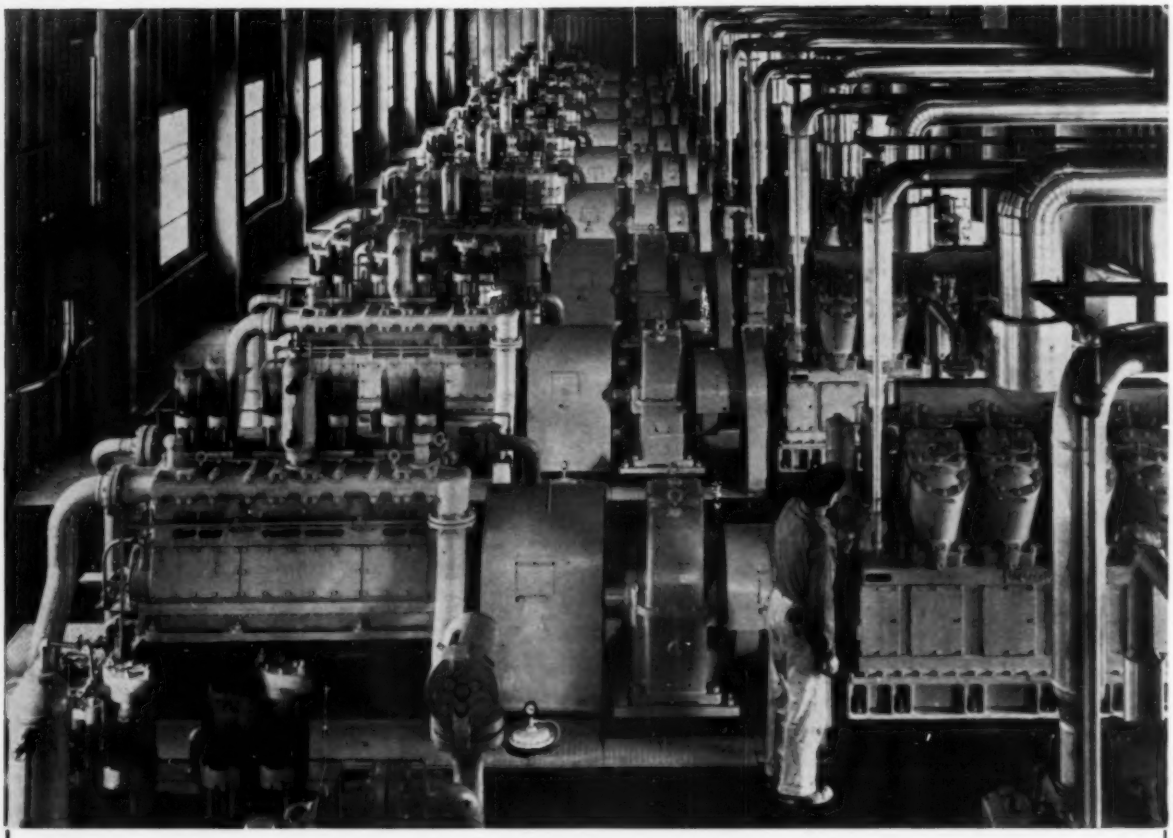

FIELD REPORT

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PUMPS: 10 Aldrich Septuplex

FLOODING STARTED: December 1954

EXPERIENCE TO DATE:

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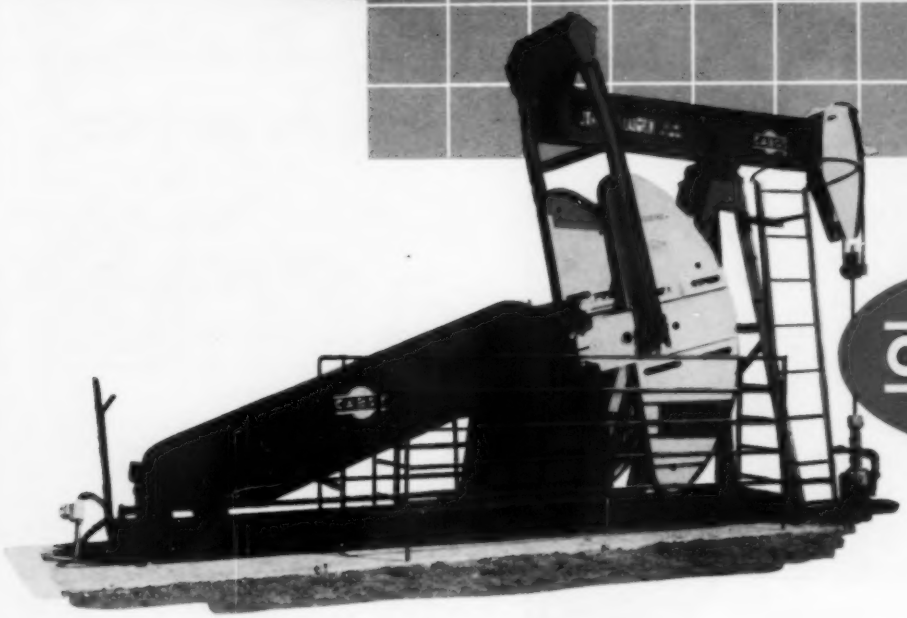

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OIL FIELD PUMPING EQUIPMENT

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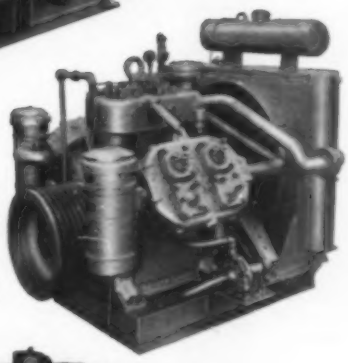
PAMPA, TEXAS

FRANKS DIVISION OF CABOT

What's new in the oil fields . . .

a report on Gardner-Denver Engineering Foresight

A giant addition to the famous Gardner-Denver mud pump line—the 1250 h.p. GX-GXH—features counterbalanced eccentric . . . threaded fluid cylinder locks and rings.



Engineered for air drilling service, these Gardner-Denver compressor units meet capacity, pressure and air temperature requirements.

One-piece cast steel fluid end on the new Gardner-Denver PE-5 130 h. p. well servicing pump, another high-pressure pump in the Gardner-Denver line.

And a new 30 h.p. waterflood pump—Model PG-3—makes seven Gardner-Denver pumps available to meet all waterflood or salt water disposal requirements.

Another great Gardner-Denver well servicing pump—310 h.p. Model PA-8K—with underslung jackshaft for compact installation on well service trucks.

And look to Gardner-Denver for engineering leadership in gas compressors, for boosting or repressuring . . . oil line pumps . . . pipeline drills . . . rotary portable air compressors . . . air hoists and air tools . . . rig-mounted air compressors. Write for bulletins, or call in your Gardner-Denver specialist.

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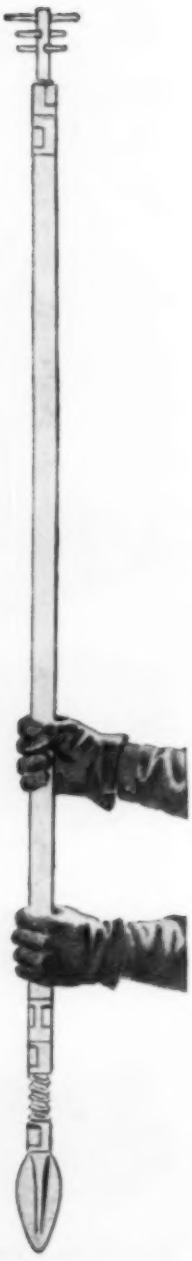

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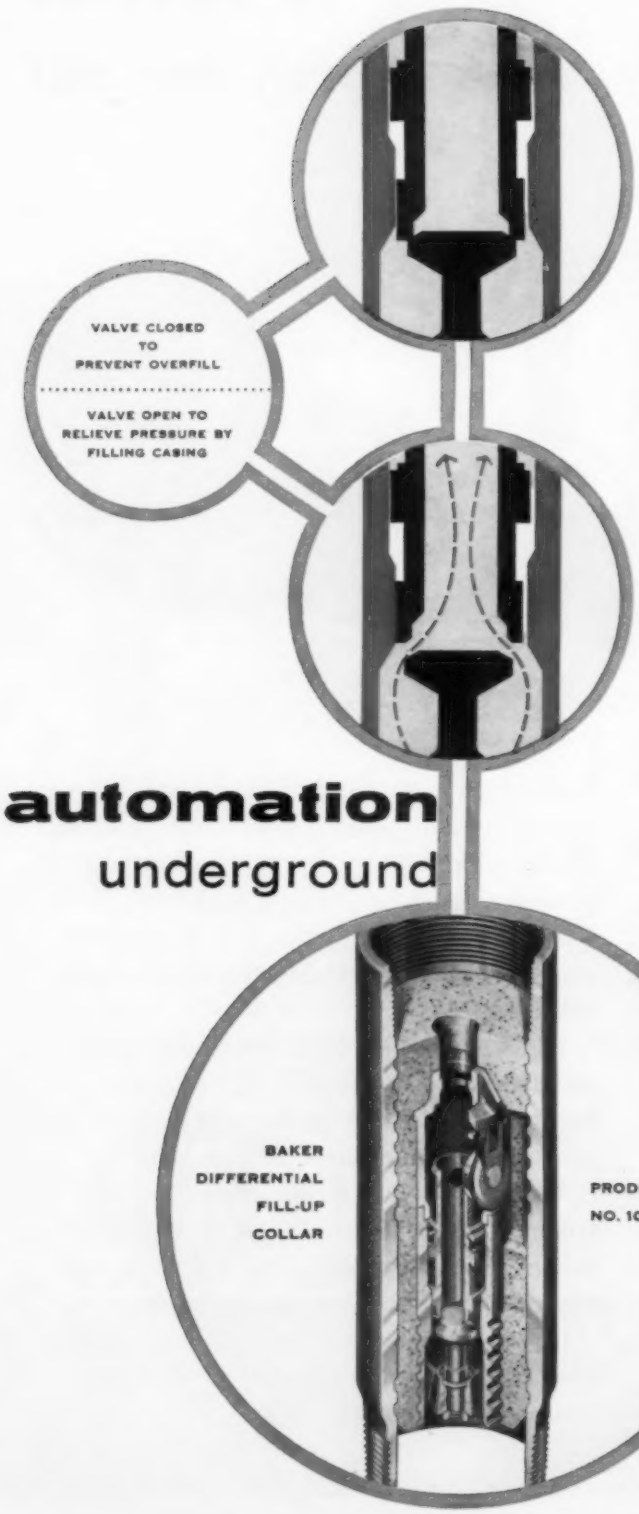
VALVE CLOSED TO PREVENT OVERFILL
VALVE OPEN TO RELIEVE PRESSURE BY FILLING CASING
BAKER DIFFERENTIAL FILL-UP COLLAR
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THE VARIABLE VALVE in Baker Differential FILL-UP Equipment is an amazing example of "down-hole" AUTOMATION. As a string of casing is lowered in the well, this valve AUTOMATICALLY takes into account the *weight and viscosity of the mud;* the *rate of lowering;* the *hydrostatic head* in the casing and in the annulus; and the *pressures* which tend to build up ahead of the descending, piston-like string of casing. Then, having *instantly* computed ALL these factors, the Variable Valve opens just enough to prevent pressure-surge build-up by permitting the casing to fill AUTOMATICALLY from the bottom up while it is being lowered. As the rate of lowering slows down (preparatory to adding another joint of casing) the pressure drops and the Variable Valve closes, thus maintaining the desired fill without overfill or overflow.

This AUTOMATION cycle is repeated each time a joint of casing is added and the string is lowered. There is no build-up of dangerous pressures which might cause lost circulation by breaking down weak formations—no mudded-off production zones—no stuck casing resulting from "no-motion" time while surface filling.

In addition, there is a definite saving in time—often as much as one-third—by eliminating messy, dangerous surface filling of casing.

For cementing (or for floating if desired) a Flapper-Type Back-Pressure Valve can be made operative *at any time* by merely applying pressure inside the casing.

Ask any Baker representative or office for Catalog Supplement #301, or arrange for Baker DIFFERENTIAL FILL-UP Equipment at your supply store.—**BAKER OIL TOOLS, INC.,** Houston, Los Angeles, New York.

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EQUIPMENT

New Concepts Spark Drilling Developments

Big changes ahead in drilling technology foretold by increased field testing of new ideas. Talk turned to action puts new tools on the board for near future

James A. LeVelle
Engineering Editor

PUT your ear to the rail of progress and today you will hear the increasing rumble of an impending technical revolution of the drilling industry. In recent years, rotary drilling has reached a new pinnacle in efficiency and overall practices have been refined to an almost exacting science. Problems created by smaller holes, deeper wells and offshore drilling have been tentatively solved. Now out of the field come more announcements of new tools being developed and tested. Many of these may well render obsolete a major portion of our present practices. These new concepts embrace the field of well logging, new ways of making hole and a new deep water method.

Drills to Come

While trends searchlight the tendencies of an industry, new tools shape its future trends. Drilling technology of 1967 will reflect many of the new concepts soon to be introduced. Air and gas drilling, the turbodrill, the percussion bit and the sonic bit are in the latter phase of development, any one of these methods may be the industry standard 10 years hence.

Air and Gas Drilling

While not new in one sense, this technique is back in the laboratory in an attempt to broaden its application. Presently limited to low pressure areas free of water flows, work is being done to devise a means of shutting off water as formations are penetrated. Both squeeze and continuous plastering the walls of the hole are being examined as possible ways of breaking this water barrier. Also, in order to improve the drilling efficiency already obtained, higher pressures and circulation rates are being applied in the field.

Results with air and gas drilling in hard rock areas have to date been just short of astounding. Penetrating rates and bit life have been increased. For example, in drilling 4500-ft wells in the Vacuum pool in Lea County, New Mexico, Magnolia Petroleum Company saved as much as $5875 per well, obtained two to four times the penetration rate and tripled bit life in comparisons between conventional and air drilled wells.

If the water barrier is successfully conquered, many more areas will be drilled by this method. Indications are that it may spell the doom of cable tool drilling in the Mid-Continent and many eastern areas.

The Turbo-drill

Predicated on the concept of powering the rotary bit at the bottom of the hole, the turbodrill is being extensively field developed to adapt this method to U.S. requirements. Primarily an extension of rotary drilling which provides more power to the bit, it is resulting in the further development of rock bits as well as in the refinement of the mud turbine. Reported to have demonstrated a considerable increase in drilling rate, it is anticipated that commercial units will be introduced to the field late in 1958.

Since this method applies power just above the bit, initial applications will be in deep drilling where frictional power loss to the bit is appreciable and in hard drilling areas where high rotary power can be utilized to increase penetration rates.

Percussion Drilling

Long dreamed of as the ideal way to drill, percussion drilling now appears on the horizon as a possible reality. Gulf Research Corporation has announced that their hammer-drill has reached suitable perfection and is ready for commercial use. The sonic drill being developed by the Petro-Mechanics Division of Borg-Warner Corporation is still under test. However, there is reason to believe that the unit is in the latter phases of development.

Gulf's drill is essentially a hydraulic hammer which utilizes the conventional rock bit as a rotating star drill. Reports state that tests show increased drilling speeds of two to four times that of rotary in very hard formations. Tool consists of a reciprocating piston arrangement which is powered by the mud stream. Unit is roughly 19 ft long and delivers 600 blows per minute with a 200 lb hammer. In operation, the bit is rotated slowly with a bit load of 6000 to 40,000 lb. Reports go further to indicate that improved bit life has been obtained in tests and that straighter holes are being drilled.

Primary drilling power is derived from the percussion forces developed by the mud driven hammer. Since rotation is slow, there is less tendency for the bit to walk or spiral. This has lead to the belief that the new method may prove of advantage in directional drilling where considerable directional stability would be desired. This characteristic would also provide better control in drilling hard zones and highly tilted geological formations.

The Borg-Warner sonic drill is still under wraps, but there are indications that field testing that has been going on for the past two years is increasing in tempo. Unofficial reports say the field tests on hard formations have shown high drilling rates. Sonic drill uses a modified star drill and is designed to operate in the infrasonic region (less than 20 cycles per minute). One of the most interesting aspects of this work is the use of resonance in the drilling string for high operating efficiency.

Other Tools on the Drilling Scene

In the field of directional drilling, one of the latest experimental devices under test is a whip stock which is carried on the bit and can be set at any time to deflect the hole. Drilling a full gage deflected hole, the advantages are obvious over our present time consuming techniques which require the running of a whip stock, drilling pilot hole, reaming and round tripping drill pipe to drill ahead. Reports show that several companies are at work in testing and developing this type of device. Due to the increasing use of controlled directional drilling, it is anticipated that full hole, reset whip stock will be introduced to the field in the early part of 1958.

There is some evidence that these new whipstocks are the forerunner of more complex tools which may be capable of closer deviation control in both straight and directional wells.

Underwater Drilling

Much discussed in the Mid-Continent, California operators have taken the initiative in the development of this new technique for core drilling operations on the West Coast. First introduced to the industry in 1956, method reached commercial perfection this year. Experience of West Coast operators shows that any type of drilling operation accomplished on land can be performed in deep water drilling with this technique.

The big advantage in underwater drilling is that wells may be drilled from a floating ship in almost any depth of water in excess of 100 ft. This eliminates the need of large mobile platforms and permits the use of smaller units to perform drilling operations. Big drawback at this time is that satisfactory methods of producing wells under water have not as yet been developed. Based on its present state of development, the technique holds considerable promise for exploratory operations but in all probability will not be used for development drilling in the immediate future.

Logging While Drilling

A new logging tool that will be introduced this fall or early 1958 will permit electric logging of formations as the bit penetrates horizons. Saving in rig time to obtain formation data is obvious. Continuous logging along with present penetration rate and mud logging charts will give the driller a new feel in drilling; a knowledge of the content of formations being drilled. While still experimental it may well prove most useful in high pressure areas in warning of possible saltwater flows and also provide a new measure of drilling progress.

Since data would be received as drilling progresses, information could be transmitted with the drilling report to provide a direct link between geologist, reservoir engineers, staff drilling engineers in the office. It would permit them to evaluate drilling progress and study production possibilities as the well progresses. Transmission of data by wire or radio to centralized headquarters would permit the supervision of drilling operations from a remote location, thus enabling one man to oversee the operation of a number of isolated rigs. These are but a few of the many important applications of the new logging that may prove of advantage in drilling operations.

Wire Line Retractable Bit

"Drill with casing, change bits on wireline" is the new concept being explored by Carter Oil Company. Primarily aimed at development drilling, technique would eliminate the use of drill pipe and would greatly reduce round trip time presently required to change bits. Method consists of running and setting bits in the casing and using the casing as the drill string. Worn bits are retrieved by the wireline method. Upon reaching total depth, the bit is replaced with a cementing float shoe and casing cemented in place.

Trends Continue

Certain trends will undoubtedly continue to shape the future whether these drilling concepts are introduced or not. Based on past history, hole and casing sizes will continue to be reduced. Following the pattern of casing programs which have progressed through the years from 9⅝ to 7 to 5½ in., it appears that the industry is quickly settling on 4½-in. casing and drilling programs based on the 6⅛-in. bit. Deeper drilling will continue to challenge and necessitate improved materials and equipment. Best current exploratory prospects are in deeper horizons and offshore or foreign operations. Many operators will look to deeper zones in the search for new oil.

In the period 1950 to 1956, it is reported that drilling costs for wells over 12,000 ft actually decreased in cost as much as 40 percent in spite of rising drilling costs. If history repeats itself, equally astounding savings will be secure in drilling wells in excess of 15,000 ft in the next 5 to 10 years.

Offshore drilling by virtue of the immense unexplored area (more than 50,000 sq miles) will increase in activity for some years to come. This must be taken into consideration in any study of future drilling technology. The high cost of offshore drilling in itself may prove a dominating factor in the progress of drilling practice and equipment. With rig time costing from $3 to $10 per minute, any reduction in drilling time will reap large benefits.

Offshore exploration drilling shows a definite trend toward the elimination of costly platform structures as evidenced by the increasing use of mobile drilling barges for this type work. Further reduction in the size of equipment required and rig expense may be made possible by the use of floating drill barges and ultimately in the discovery of other new ways to cope with the sea.

Unless the submarine completions or another new method is perfected soon, development wells will continue to be drilled from fixed platforms. This will mean that more and more directional drilling will be used to more economically amortize the high cost of platforms. It is predicted that 75 percent of the wells completed offshore will be drilled by controlled directional drilling techniques. Graduation of this method to major use in development drilling will make improvements in this field all the more important. The new design frontier for drilling tools may well be in deviated hole drilling and ways of making directional wells more economical.

The foregoing represents but one phase of the changing scene. Many factors foretell a tremendous increase in the development of drilling technology and accelerating progress. Declining discovery rates, deeper drilling and higher costs are stimulating added research into the basic fundamentals of penetrating the earth. Companies never before in the drilling field have become interested and are bringing with them the technology of other industries. In a broadening search for improved methods, other industries and the technology of other countries is being studied.

With this increased activity in research, there is little doubt that many new methods will be found to make more hole faster, better, and for less money. ★ ★ ★

Drilling Equipment

Newest products, tools and services are reported by leading suppliers in drilling and exploration fields

GEOLOGICAL TOOLS

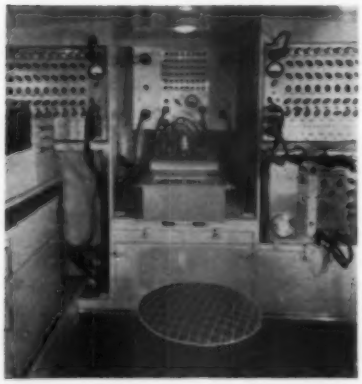
Recorder-Playback Seismic Service

101 Petty Geophysical Engineering Company has started operation of a new seismic exploration service.

The advantages of magnetic recording for multiple filtering and mixing operations have been well established by past experience. Step-out removal, correction of traces for weathering and elevation, and presentation of data referred to a common datum are more complex operations, but offer far greater utility of magnetically recorded seismic surveys. General application of these operations has been limited, however, by two factors: (1) The delay and inconvenience involved in central office processing of data. (2) The high cost which would be entailed in setting up independent playback — correction facilities for single crew operation to permit current processing.

These factors have been resolved in the illustrated mobile unit by integrating equipment which serves the dual function of field recording and data processing on playback.

During the day the unit functions as a field magnetic recording truck. At night office personnel operate equipment to make corrected playbacks of the preceding day's work for which appropriate corrections have been computed. All functions of the playback process are completely checked, and the corrected and checked playback records are then assembled into a completely corrected record section for interpretation. Since this mobile unit eliminates tedious hand plotting of record data, and has the facility of applying variable corrections to the photographically plotted data, the descriptive name "Mobile Vari-Plotter" has been adopted.



Synchronized timing and automatic photographic scaling of field and playback records are employed so that the playbacks can be made without additional personnel. This type of operation is feasible whenever the operating equipment can be returned to base during off hours, and is economical because the investment in capital equipment is increased only by the cost of the variable correction unit. All other components serve equally for recording and playback purposes.

This service is now in operation on a production basis, and additional units are under construction. Close coordination of instrumentation requirements and field operating procedures with Petty Laboratories, Inc. has made this advanced service a reality.

Petty Geophysical Engineering Company

Fluorescent Core Inspection

102 The new "Mineralab" Fluorescense Analysis Cabinet is being produced by Ultra-Violet Products, Inc. It is a self-contained portable unit for use in the field or laboratory and can be operated by both a battery and 110-v a-c or d-c current. It is a complete darkroom in itself and includes both long and short wave ultra-violet, as well as white light for comparison purposes.

Some 3000 substances may be actuated by invisible ultra-violet to emit their own unique glow or fluorescence and thus be identified, compared or inspected. The cabinet has easy-to-open

doors so specimens can be slipped in and out without effort. The Mineralab is just 14 by 12 by 14 in. and the front platform can be lowered to permit the use of a microscope.

Of particular interest to the petroleum industry is its value in oil core inspection on the job, in the field and in the laboratory.

Ultra-Violet Products, Inc.

New Walking Magnetometer

103 Walking Magnetometer, claimed to be as revolutionary for oil and mineral prospecting as the Flying Magnetometer, is announced by the Radiac Co., Inc. It is used to measure the vertical component of the earth's magnetic field for the solution of a wide variety of geophysical exploration problems.

Used like a scintillometer or geiger

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counter, Magnetometer locates and delineates sub-surface magnetic minerals directly such as magnetite and pyrrhotite and locates minerals of varying magnetic character and oil-bearing structures indirectly. Magnetometer anomaly studies may indicate and permit mapping of placer deposits, buried contacts between 2 materials of ap-

preciably different magnetic susceptibilities, ridges, faults, salt domes and other oil structures, etc. It can be used to locate and trace magnetic and nonmagnetic ore formations in the absence of rock outcroppings and can be operated over areas covered with muskeg, snow and water, where the conventional magnetometer cannot be used with ease. It also can be operated from a non-magnetic boat for prospecting the bottoms of small and large bodies of water.

The Radiac Company, Inc.

Analyze Weak Magnetic Fields

104 An unusual electron beam tube with wide applications in analysis of weak magnetic fields has been

demonstrated by Multi-Tron Laboratory, Inc.

It has been developed for application in an instrument that measures very weak magnetic strengths, such as those of mineralogical samples removed during oil well drilling.

This electron beam tube is 20 in. long and has a constructed mid-section for convenient positioning of the test samples.

Several important research areas now find the study of extremely weak magnetic fields to be essential to further advances in their technology.

Multi-Tron Laboratory, Inc.

Rotary Drills 700 Percent Faster

105 Mobility and rapid set-up are 2 advantages of a new truck-mounted rotary drill which is especially valuable in water well and shot hole drilling. Actual field reports show that this unit, known as the Schramm Truck Mounted Rotadrill, makes hole 600 to 700 percent faster than is possible with the best churn drilling technique.

Rotary air drilling is accomplished through a reversible hydraulic motor-driven head, mounted on a carriage that rides tracks mounted on the mast. This hydraulic head plus the special slip holders eliminate the need for a rotary table. Sticking of the bit will not damage the hydraulic drive. Maximum down pressure is 24,000 lb and maximum lifting is 19,000 lb. Holes can be drilled to 700 ft with 4½-in. OD drill pipe, and to 1500 ft with 2⅞-in. OD drill pipe.

Mast is heavy structural steel, raised and lowered by hydraulic cylinders and is 30 ft high, with 25 ft travel for 20 ft 6-in. drill pipe.

Hydraulic control valves are mounted in three banks, complete with pressure regulator and hydraulic gage for controlling feed. There are individual valves for each outrigger, for forward or reverse motor rotation, for slow or rapid down feed and for the breakout cylinder.

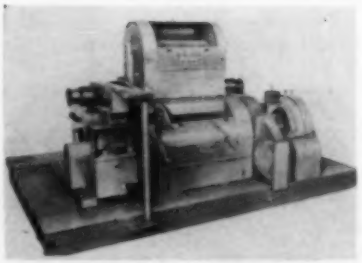
A Schramm air compressor driven from the truck engine through a power take-off normally delivers 450 cu ft per min at 20 psi. However, for dewatering or breaking out blockages, air can be delivered at 200 psi. Standard rig equipment includes dust blower, primary chip box, hose, dust diverter, discharge stack, pipe rack on side of truck, dual fuel tanks, 65 rpm rotation head, drilling and holding slips and an air hoist with a special hook for handling drill pipe.

Schramm, Inc.

DRILLING RIGS and Equipment

Largest Drawworks and Pump

106 Bethlehem Supply Company placed on the market early this year their new B-3661 Drawworks, which is capable of drilling to any depths required now or in the predictable future. This is the largest drawworks built to date in shaft size, drum dimensions, brake flanges, chain, bearings and clutches. The recommended input horsepower to the transmission is 2100 hp, additional horsepower capacity can be provided for driving larger mud pumps or other auxiliary equipment. The drawworks is offered with 4 speeds for electric motor application and 6 speeds and reverse for internal combustion prime movers. Suitable compounds for 3 and 4 engines are available and may be had with 2-speed pump drives. In the case of electric motor drive, 2 or 3 motors may be used,



each with its own chain drive to the drawworks. An upper drum assembly is available which mounts as a unit on top of the drawworks and is driven by a chain from the catshaft.

Bethlehem is also offering the first big slush pump designed for deep jet drilling. It is an 8-in. bore by 16-in. stroke pump with a 6-in. minimum liner bore and a maximum pressure of

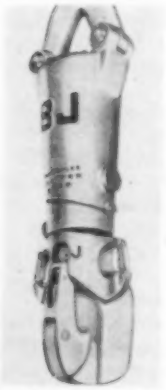
4570 psi. In order to achieve such capacity without exorbitant increases in weight and size, new materials and techniques have been developed. Pump crankshaft assembly is counterbalanced to reduce the unbalanced forces to a minimum. Bethlehem has taken steps toward eliminating fluid end troubles by designing a forged steel fluid end studded according to API-ASME Code for unfired pressure vessels and equipped with screw-type valve covers.

Both B-3661 and B-1640 are soundly engineered to meet all requirements for deepest drilling.

Bethlehem Supply Company

First 500-Ton Hook

107 Largest capacity hook manufactured for the petroleum industry has been announced by Byron Jackson Tools, Inc., a Borg-Warner subsidiary. New 500-ton capacity tool is a new concept of hook engineering. Every facet of conventional hook design was studied objectively and retained only if it could not be improved upon. Result is the "5500," a rugged, streamlined giant created expressly to safely hold the long strings of pipe and hook-and-elevator load and prevents unequal loading on the ears of the elevator. Hook has the weight (9950 lb) to guarantee a fast, straight fall even when the largest diameter drilling lines are used.



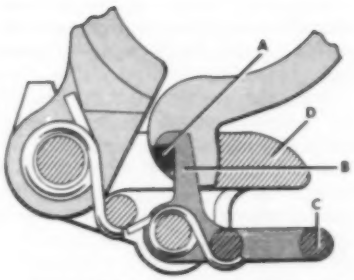
Byron Jackson Tools, Inc.

Safety Locked Tubing Elevator

108 New elevator is equipped with a "Safety Lock" having hooks that engage behind fingers as the elevator is closed and keep it locked safe from accidental opening. When this Safety Lock is manually opened by a crew member the main latch also is released and a strong spring mounted around the hinge pin automatically opens the elevator wide for removal from the tubing.

Web Wilson Type "SCT" Elevator is made of heat treated manganese-molybdenum steel, and in addition, the top bearing surface which lifts under the tubing coupling is flame hardened to ensure long wear.

Web Wilson Safety Lock Tubing Elevators are now furnished in 2 sizes: For 2⅜-in. OD tubing and 2⅞-in. OD tubing. Other popular sizes will be available soon. Capacity of either size is 65 tons, approximate weight 60 lb, and they are used with links from 1¾ to 2¾-in. diameter.



SHOWING OPERATION OF SAFETY LOCK
A- Finger — B- Safety Hook
C- Safety Latch Handle
D- Latch

Web Wilson Oil Tools, Inc.

Small Swivel, Rotary Developed

109 A new, small swivel and an improved 20½-in. rotary machine have been developed by The National Supply Company.

National J-13 Swivel is intended for use with small portable or trailer-mounted rigs in exploratory, slim hole, and shallow drilling operations, and workover jobs. Designed for a drilling depth of 1000 to 3000 ft, it has a comparative dead load rating of 60 tons.

Specifications
National A-205 Rotary

Table opening for bit or casing	20½ in.
Center of table to center of sprocket	53¼ in.
Gear ratio	3.14 to 1
Pinion shaft size	
In pinion	5.375 in.
In cylindrical roller bearing	5.375 in.
In spherical roller bearing	4.726 in.
Oil reservoir capacity	8 gal
Net weight, including table bushing and cover	10,450 lb

NOTE — Load ratings are expected to be higher than the former 20½-in. machines. As soon as tests are completed, this information will be released.

Although it is the smallest swivel the company has ever produced, it incorporates many of the features of the larger Type N Swivels. Made with a high strength-to-weight ratio, it weighs only about 640 lb and has a low center of gravity for stability in handling.

Swivel body is a 1-piece steel casting with smooth contours, both internal and external, for efficient lubrication and maximum operating safety. It is constructed so that all loads are transmitted to it from the bearings and bail without passing through any bolts. Both the gooseneck and the gooseneck support are 1-piece steel castings. The gooseneck has a reinforced fluid passage with smooth contours for minimum mud resistance and erosion.

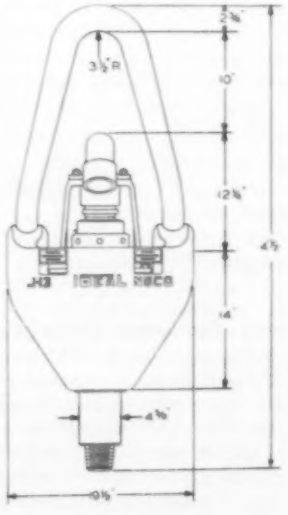
A conventional forged steel bail, 2¾ in. in diameter, is provided. An adapter-type bail with elevator shank is available as an alternate when it is desired to suspend the swivel from the elevator.

Wash pipe packing assembly provides an improved method of packing off the mud.

Type A-205 Rotary is a 20½-in. rotary that follows the modern design of the Type A-175, introduced last year. It is made in a rectangular shape, simplifying installation in the derrick substructure and permitting the rig flooring to be fitted up flush with the table top on all sides. Square corner flush mounting contributes to cleaner and safer working areas and also eliminates the difficulties of flooring up around curved surfaces.

Other new features of these rotaries include the use of a cartridge-type pinion shaft assembly, a unitized table and bearing assembly, and direct locks for the table. Oil bath lubrication is provided throughout, and mud and oil seals are provided. Lock pawl handles, the oil filler cap, dip stick, and lifting trunnions are accessible from the top of the rotary.

The National Supply Company



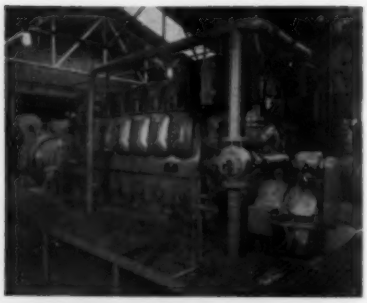
Power Increased for Drilling

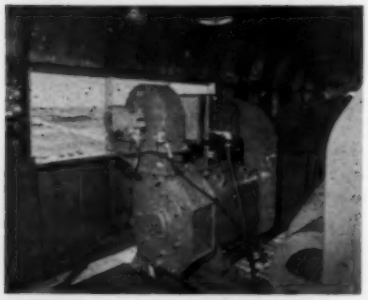
110 ALCO has modernized the design of their drilling power package, incorporating a new standardized control concept to the time-proven diesel drive.

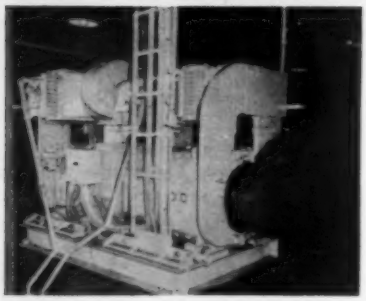
New controls retain the original principal of operation but have been further simplified and standardized to provide greater flexibility to drive assignments than is now possible. Controls

also are arranged so that field conversion kits can be used to convert any one standard package built to the new design to any other standard combination of drives or modifications. These conversions can be accomplished merely by adding or deleting devices, without changing the control cabinet and with only a minimum of wiring revision.

An expanded list of modifications is







Components of Diesel-Electric drive installed on Coral Drilling Company's platform, Mr. Arthur. Engine-generator (top) power has been boosted through the use of packaged Aftercooler which increased power 125 hp. Drives on drawworks and one of the pumps is shown in middle and bottom photos respectively.

available to provide additional combinations of equipment as desired.

The drilling power package supplied Coral Drilling Company recently entered service in the offshore Mississippi Delta on the $4 million submersible barge Mr. Arthur.

Concurrent with announcement of the new control design ALCO is also now offering the aftercooled model of its 6-cylinder Model 251-B engine, with a rating of 975 bhp — 125 bhp more than the non-aftercooled engine previously furnished with the power packages.

Increased engine capacity permits full utilization of the revised intermittent and continuous duty ratings of the 625/800 hp GE 752 H motors offered as part of the package. Ratings also provide greater reserve power for auxiliary a-c or d-c generation.

ALCO Products, Inc.

Drive Tailored for Drilling

111 New Type VS Class 2F, gyrol fluid drive for oilfield rotary, slush pump and drawworks applications are now available from American Blower Corporation. New enclosed, completely self-contained unit features a special oilfield design of all-welded heavy gage steel housing and 4 heavy duty oil lubricated spherical bearings for mounting input and output shafts. It is available for infinite adjustment of speed and torque. It will fit standard 18-in. channel oilfield skids.

American Blower Corporation

New Two-Cycle Engine Developed

112 A new 2-cycle turbocharged diesel engine, which adds 25 percent more horsepower with no appreciable increase in bulk, weight or operating cost, has been developed by Detroit Diesel Engine Division of General Motors.

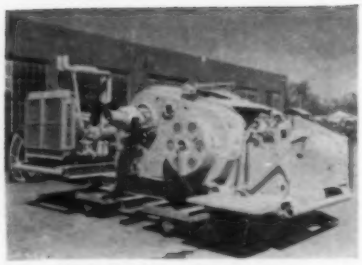
According to Robert E. Hunter, division general sales manager, unit is a 6-cylinder Series 110 model with an increase in horsepower from 300 to 375. This provides a substantial increase in power in an engine of the same size now used extensively in a wide range of oilfield applications.

Addition of a single-stage, free turning centrifugal exhaust turbine to the GM diesel engine lowers the fuel consumption yet gives more power per pound for oilfield use. Impeller boosts the intake air pressure and reduces the load on the engine-driven blower. The result is approximately twice the air box pressure for more complete scavenging and combustion.

Detroit Diesel Engine Division, General Motors Corporation

Torque Converter Draw Works

113 New Cardwell L-350 is a compact, single or twin engine draw works using plate-frame construction to achieve a high strength to weight ratio and permit oil bath lubrication to all chains. This extremely versatile unit is readily adaptable to various trailer



mountings as well as conventional skid masts. All controls are centralized and mounted in a simplified control panel which allows driller full view of all drilling operations.

Fawick clutches, when used with the torque converter, provide instantaneous selection of a full range of line speeds and pulls. These high and low drum clutches are exterior mounted on the main drum shaft and provide easy accessibility when servicing is required. A 15-in. double rotor hydromatic brake, complete with Fawick disconnect clutch, is internally mounted and chain driven.

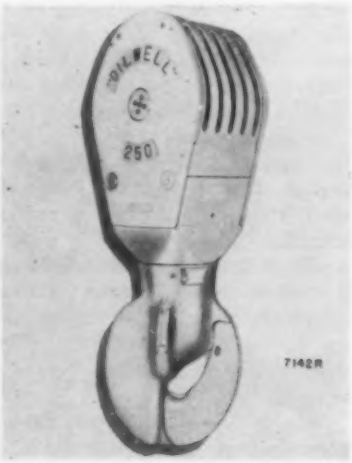
All standard makes of air actuated break-out and manually operated friction spinning catheads are available. The optional sand line drum is located to permit a lower over-all height.

Cardwell Manufacturing Company

Block-Hook Increases Working Space

114 Now the "Oilwell" 250 and 200 Ton Traveling Blocks are combined with either Byron Jackson or Web Wilson Hooks. These combinations are real space savers for portable mast operators.

Streamlined and compact, they provide additional working room in the derrick and are short so the full height of the derrick can be used. Though overall dimensions have been reduced,



these block hooks are free-falling even without load, and no weights have to be added. Their low center of gravity keeps them plumb in the derrick, free from wobbling and cocking.

All known safety features have been incorporated in these blocks. Sheaves are adequately guarded, and safety hoods are firmly fastened to the block by through pins. The center pin has a load rating far beyond the rated load of the block, and there are no protruding cap screws, nuts, plugs, grease fittings, or other parts in the streamlined, heavy-duty steel side plates.

A principle feature is the use of heat-treated maganese steel sheaves. This steel gets harder under use, thereby maintaining true groove dimensions. This adds greatly to wire-line life, since lines are not pinched or cut by worn grooves. Sheaves are precision balanced, and grooves are ground to API specifications.

Heavy-duty, straight-roller bearings with hardened inner and outer races support the sheaves. Individual grease passages are provided to each bearing from recessed grease fittings in both ends of the center pin.

Oil Well Supply Division, United States Steel Corporation

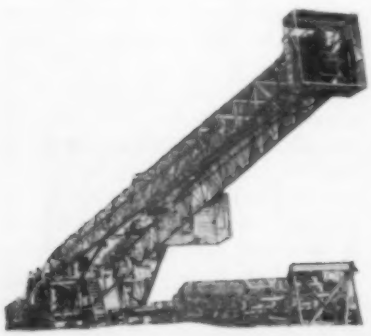
Convertible Mast Has 300,000-lb Capacity

115 A new highly portable free-standing mast for medium-depth drilling has been announced by Ideco, Inc. Named the Junior Full-View, the new mast has the same basic structural design and raising system of the larger Full-Views. Nominal gross column capacity is 450,000 lb and rated hook capacity is 300,000 lb with 8 lines strung. Exceptional stability and reserve strength has been confirmed by comprehensive strain gage tests under maximum loaded conditions.

New features of the mast include twin columns with a triangular cross-section which are joined above the racking platform into a one-piece top section. Making the mast easily adaptable for a variety of applications is a new convertible arrangement by which it may be changed from a 98-ft doubles to a 132-ft trebles mast simply by adding one section and reversing pedestals and base shoes. Elevation of the pin-connected racking platform may be adjusted from 50 to 56 ft on the 98-ft mast and from 79 ft 8 in. to 88 ft 8 in. on the 132-ft mast. Twin pipe set-back design of the racking platform allows room for casing to be brought in between full stands of drill pipe.

Junior Full-View Mast Specifications

Catalog Number	JFM98-300	JFM132-300
Height (Floor-Water Table)	98 ft	132 ft
Max. Rated Static Hook Load		
6 lines	280,000 lb	280,000 lb
8 lines	300,000 lb	300,000 lb
Racking Platform Elevations —		
Total racking capacity	50-56 ft	79 ft 8 in.-88 ft 8 in.
3½-in. OD Drill Pipe in Twin Setbacks	9500 ft	15,000 ft
4½-in. OD Drill Pipe in Twin Setbacks	7560 ft	11,340 ft
5-in. OD Drill Pipe in Twin Setbacks	—	—
2⅞-in. OD Tubing in Half of Platform	7500 ft	11,300 ft
Number of Sections	3	4
Mast Leg Cross Sec. Dimension	3x6 ft	3x6 ft
Line Pull During Erection Using 8 Lines	22,000 lb	17,500 lb
Mast Weight Complete with Base Shoes and Pedestals	35,800 lb	41,000 lb
Nominal Gross Column Cap.	450,000 lb	450,000 lb



Maximum racking capacity for 4½-in. drill pipe is 11,300 ft with the 132-ft mast and 7560 ft with the 98-ft mast.

Unusually portable and easy to rig up for a mast of its capacity, it features sledge-pin connections throughout. Substructure, as well as the mast, is made up completely of road-width sections. Another advantage of the triangular column design is the exceptional resistance to damage in field handling. Mast may be lowered to horizontal, removed from the base and carried on a truck and dolly in one piece with all lines strung. The twin columns are easily folded to road width, if desired, by removing 2 pins. In addition to single-package moves the mast may be separated into sections and transported on semi-trailers. Weight of the 132-ft mast is 41,000 lb, complete with base shoes and pedestals. Weight of the 98-ft mast is 35,800 lb.

Ideco, Inc.

Swivel Has Oversize Bore

116 The industry is getting its first look at the new 40 KG and 50 KG swivels by King Oil Tools which will replace King 40 XV and 50 XV swivels for shallow wells up to 4800 ft. Best features of the XV's have been retained and several important new features added to the new swivels. The KG series contain a new washpipe and packing box arrangement which permits a much higher rotating speed. Packing can be changed without "breaking-out" and the possibility of thread-galling is eliminated.

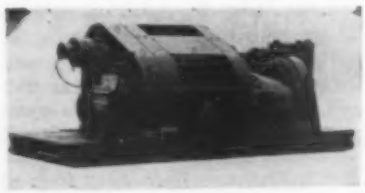
Other features include: A Zerk fitting to assure easy lubrication of V-type packing; an adjustable stuffing box to insure maximum life of the packing. Complete packing unit can be replaced in the field within 10 minutes which results in less "shut down" time. Another feature is an oversize watercourse which makes KG swivels ideal for drilling by conventional and reverse circulation methods. Swivels have been tested in field and factory for the jobs they were designed to do. These jobs include: Drilling relatively shallow oil wells, the deepest of water wells, workover rigs, slim hole drilling and "drilling in," and coring oil wells by the reverse circulation method.

King Oil Tools

Drawworks Built for Deep Drilling

117 Built for economical drilling to the greatest well depths, Continental-Emsco Company's new A-1500 Drilling Rig follows the basic design already proved and widely accepted in the smaller A-800.

The problem of ease of transportation of big rigs over the nation's highways was solved with the portability design of the A-1500. Drawworks, 3 engines and engine compound, selective transmission and 2 high capacity pump



drives may be hauled in only 4 well-balanced roadable packages. Assembly of component units is quick, easy and alignment is positive.

In the A-1500, operators are offered a wide choice of engines through a 2, 3 or 4-engine compound; flat or step setting; side or rear mounted pump drives; mechanical-fluid or magnetic couplings or hydraulic torque converters, if desired.

Elimination of lost drilling time for the purpose of greasing, plus prolonged equipment life, is accomplished by an automatic lubrication system. All bearings, chains and other moving parts are constantly lubricated by a multiple pump system and safeguarded by strainers and filter.

All controls for complete air operation are contained in a console type panel. Entire panel may be quickly telescoped into the skid for hauling without disconnecting any of the control air lines.

Continental-Emsco Company

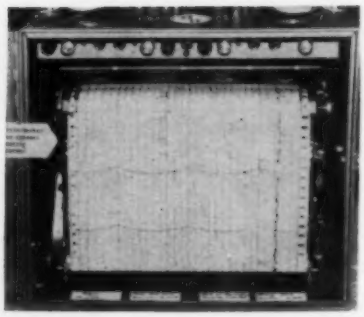
System Keeps Track of Rig

118 The investment in a drilling rig is becoming greater each year as the demand for deeper holes and greater speed and efficiency increases. Daily operating costs have risen tremendously in the last few years and are as much as $10,000 per day in some areas. The operator deserves much more information concerning his equipment and its operation than he now receives. A daily drilling report, even at its best, is a poor record of a rig's activity.

Martin-Decker has developed and is now offering a new Electric Recording System that will give a complete and permanent record of the day's operation and presents it in a manner that is neat, accurate and easily interpreted. These Electric Recording Systems combine the accuracy and sensitivity of laboratory instruments with the ruggedness and dependability associated with Martin-Decker equipment.

The recorders are equipped with 1, 2 or 4 channels, and each channel can be used to record any of the following functions: Total hook load and weight on bit, pump pressure, pump speed or volume, rotary speed, rotary torque, tong torque, rate of penetration, line or wellhead pressures, any pressure signal up to 15,000 psi, and any rpm signal up to 3000 rpm.

From the equipment on the rig floor a specially designed transducer or an a-c generator is used to take the indicated function and change it to an electric signal, and from there this signal can be transmitted through any length of electric line to the toolpusher's office or doghouse. Here, away from all



normal rig hazards, a neat, dependable, accurate record can be made of the total drilling operation. The drilling superintendent, engineer and geologist can all find extremely valuable information on these charts. Drilling breaks are positively identified as such and are not a result of added weight, speed or pump pressure. Reoccurring equipment failures or loss of time become easy items to check and better evaluation of time and costs can be derived.

Not only can special tests be completely controlled and monitored, but also in normal daily operations the record from this chart furnishes more information than any present rig report.

The modern operator with his tremendous investment needs more information on what his equipment is doing and where opportunities lie for bettering his situation. Martin-Decker Electric Recording Systems provide this information and offer both crew and operator an excellent tool for the improvement of their operations.

Written by Jack Knowlton, Sales Engineer, Martin-Decker Corporation

Single Trailer Mounted 126 Ft Mast

119 Lee C. Moore engineers have designed a new 126 ft single trailer mounted mast combining rugged strength with maximum portability.

Designed primarily for foreign service, mast has a clear height of 126 ft with a 12 ft leg spread at the base and a gross nominal capacity of 420,000 lb.

Complete mast with blocks strung together with drawworks and power combination is transported from one location to another on a single trailer to provide greatest possible speed in moving and assembling.

The mast, which has a retractable top section is extended full length while in horizontal position and mechanically raised to drilling position by traveling block and slingline.

Legs are in true alignment without overlapping during drilling operations to assure maximum strength and rigidity.

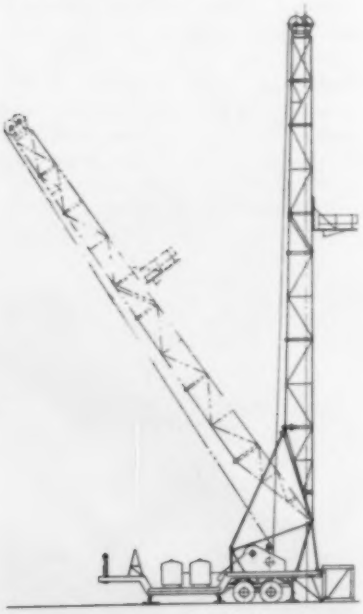
Well loads are inside the mast structure, thus eliminating guy lines.

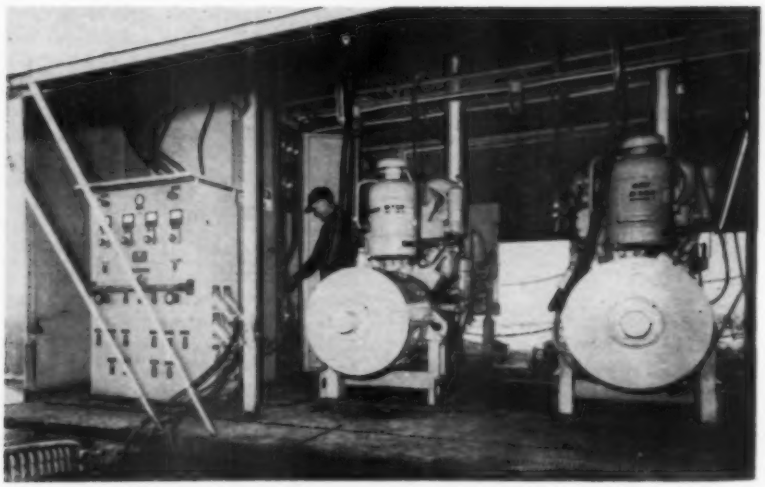
A built-in fifth wheel hoist makes leveling the mast simple and fast by means of truck winch.

A walking beam tandem assembly specially designed for rough terrain provides equal load distribution to each wheel and is interchangeable with a steel track walking beam.

Mast design will accommodate a variety of drawworks and power combinations.

Lee C. Moore, Inc.





Control Built Into Electric Rig Drive

120 General Electric manufactures a complete line of electric drilling drives that makes use of the maximum simplicity and flexibility of operation characteristic of this relatively new type of drilling system. With this equipment there is less chance of damaging drilling rig machinery during an emergency than there is with mechanical compounds, torque converters or other types of electric drives.

The possibility of control system failure and resultant dangerous speed and torque is greatly lessened through the use of differential generators and shunt wound motors that inherently possess the control characteristics otherwise obtained only through the use of external current and voltage regulating controls, feedback systems and torque limiting devices.

Unlike the series motor the G-E shunt motor will not speed out of control with a sudden loss of load. Speed and torque are completely regulated and excellent braking characteristics are built in.

Generators in General Electric's drive systems can be coupled to most oilfield engines. The company and the engine builder work together to develop a completely engineered package.

Two types of generators are available. The GT 558RI is a single-bearing flange mounted self-ventilated machine that ranges from 200 hp at 1200 rpm to 350 hp at 2100 rpm. The 2 bearing single shaft GE 752J generator is available for ratings as high as 600 hp at 1000 to 1300 rpm.

Powered by either of these generators is the GE752H2 motor which is rated at 625 hp continuously and for hoisting duty can be operated at up to 1000 hp at 950 rpm.

The control system consists basically of a main control panel which can be remotely located and a portable driller's console from which every drilling operation can be controlled. Engine speeds are regulated by standard air throttles.

These basic components are made up into systems that operate everything from the largest offshore drilling rigs to versatile trailer mounted land rigs.

General Electric Company

The Search for Better Liner Packing

121 How research in the Houston pump parts laboratory of the Mission Manufacturing Company resulted in the design of a liner packing offering utmost durability is being told in reports from the field.

But, the story starts in the pump parts laboratory.

A key part of this laboratory is the two test pumps. These pumps are frequently required to operate 24 hours a day, pumping mud at discharge pressures ranging up to 2000 psi. This type of operation is necessary in order to quickly determine how well experimental parts work under severe conditions.

To facilitate operations, both pump and engines have been equipped with safety devices to permit unattended operation. One of these devices shuts down operations in event of a leak in the liner packing.

Mission engineers found they experienced considerable delay because the pump frequently was shut down during the night as a result of liner packing leakage. Normally, this leakage can be corrected simply by tightening the packing, rather than replacing it.

Accordingly, they searched for a packing that did not require frequent tightening under these severe conditions. Failing in this search, they next decided to try to develop a packing that would require fewer adjustments.

An analysis revealed that existing packings required frequent adjustments because part of the rubber packing element extruded into the space between the liner and pump bore. Since the liner rocked slightly while the pump was operating, pieces of the rubber were pinched off at each stroke. This caused wear and loss of adjustment.

A Mission engineer came up with a new multi-element packing design. The cross section of the flexible packing ring had the shape of an elongated hexagon, and semi-flexible nylon back-up rings of V-shaped cross-section were used at each end of the flexible element.

Thus, when the packing was tightened, these back-up rings spread and completely filled the annulus between liner and pump. Perfect containment of the flexible packing ring was provided.

After the basic design was made, the remaining problem was to select the right material for the back-up rings. It had to be rigid enough to back up the packing element, yet soft enough to spread properly with moderate tightening. Also, it had to be easy to insert and remove.

After considerable testing, a special plastic was selected which met all requirements. Then, test packings were subjected to a series of laboratory and field tests.

Results proved without doubt that the need for periodic tightening of packing was practically eliminated.

Liner packing performance stories are now available in quantity from the field on the Mission Super Service Liner Packing.

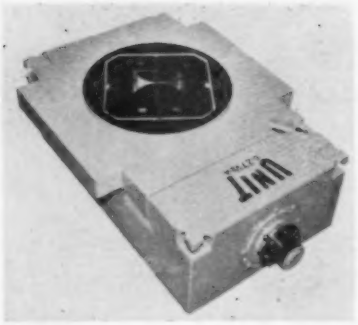
Mission Manufacturing Company

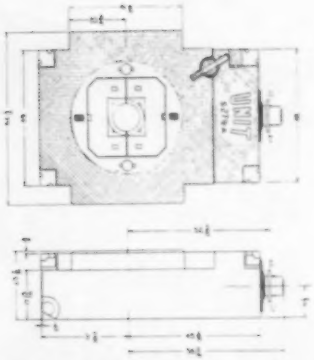
Big Rotary Added to Line

122 A new 27½-in. Rotary Table has been added to Unit Rig's line of equipment. Triple labyrinth mud seal and flinger rings make table mudproof. Handling lugs are designed with open ends for quick handling and rectangular lines permit quick and easy flooring buildup.

Locking device works on perimeter of table, eliminating all shock loads from gear and pinion. Gears are spiral bevel lapped and matched for smooth performance and hardened to provide long life. Master bushing is locked in place with a single lock operated from top of the table.

Heavy duty main bearings consist of 32 three-inch balls accurately matched for good load distribution. Gear and pinion, inboard pinion shaft





bearing and main load bearing are all oil lubricated. Outboard pinion shaft and stabilizing bearing are grease lubricated. Rotary sprocket uses a bolt on type hub for quick change or replacement. Unit Rig now offers 17½, 21 and 27½-in. table openings with 44 in. (short), 53¼ in. (long) center line sprocket to center line well pinion shafts.

Unit Rig & Equipment Company

DRILLING BITS - TOOLS

Diamond Bit Resists Damage

123 Difficulty with junk damaging bits and sticking of conventional diamond bits in South Louisiana drilling has led to the development of a revolutionary diamond bit design. Called the Tri-Dia bit by manufacturer, Drilling & Service, Inc., it is a triangular design having the same projected area as the conventional 3-cone rock bit. Custom designed to specific drilling conditions, it is offered in both full hole coring and drilling style bits.

Evolving from the need to reduce the possibility of sticking and facilitate increased circulation, the bit has proven to have a number of outstanding advantages in all types of diamond drilling. Increased by-pass area provided by the flat sides of the bit permits circulation of junk and cavings off of bottom, reduces the chance of sticking due to wall cake, swabbing action, etc. With the projected shape roughly the same as a rock bit, it assures that the bit will get to bottom when following conventional bits and without the unfavorable hydraulic action often encountered with the full ring type bit.

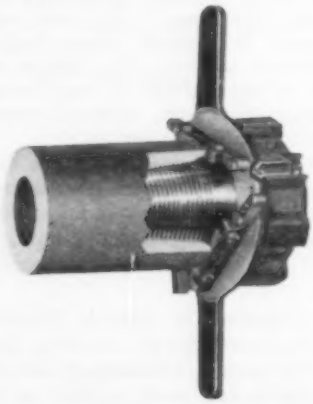
One of the most interesting results has been the reduced bit damage encountered where drill bit teeth, tong-die or other pieces of junk iron have been left in the hole. With conventional circular diamond drill bit shapes this material normally stays beneath the bit and results in severe damage to the bit and loss of diamonds. With the triangular design of the Truco Tri-Dia bit this junk iron is circulated out or if too large is washed to the periphery of the hole to ride in the relieved portion of the bit ring. In recent coring operations in the Four Corners area near Farmington, New Mexico, a tong-die fell into the hole on the third trip with a 7¾ by 3½-in. Tri-Dia diamond core bit. Too large to circulate out, the tong-die rode beside the bit during the whole coring operation. The bit made 50 ft of full size core hole and came out with virtually no loss of diamonds or damage to the bit.

While the spectacular characteristics discussed above add to the safety of the bit, more practical features are the savings in drilling costs made possible by increased bit hydraulic horsepower, higher annular velocities and the ability to custom manufacture bits to the specific rig and well requirements. This has resulted in considerable savings in drilling.

Drilling and Service, Inc.

Improved Shoulder Refacing Tool

124 Big Four Machine & Supply has designed an improved drill string threads refacing device. Unit consists of 3 parts—a threaded adapter, a tension nut assembly and a filing head assembly. The device is used to reface box and pin shoulders on rotary drill pipe and drill collars at the rig when



only a worn or damaged shoulder is causing the joint to leak.

By changing the threaded adapter, it can be used on 3½, 4 and 4½-in. tool joints of different type of thread, and using the same tension nut and facing head for all above sizes and types of thread. Refacing tool is available in other sizes, also.

Big Four Machine & Supply Company

Get Your Money's Worth — Send Reader Service Card

Two Bearings Designed for Reamer

125 No one design of a drilling tool performs with its greatest efficiency in every area and every formation. Grant Oil Tool Company's 30 years of experience in manufacturing drilling tools has shown that design variations are necessary to give optimum performance under different drilling conditions.

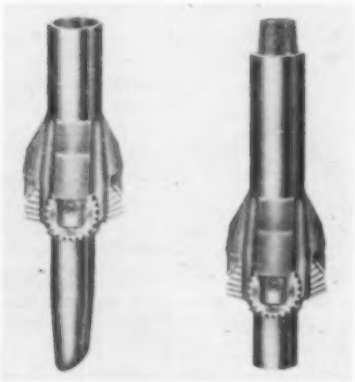
Because of this fact Grant has in the past made its tools available in more than one design to meet drilling conditions. Grant roller reamer-stabilizers are made in 2 models, the 1530 and the 6480-A. Each incorporates the same pattern of cutters but differ to meet varying hole problems.

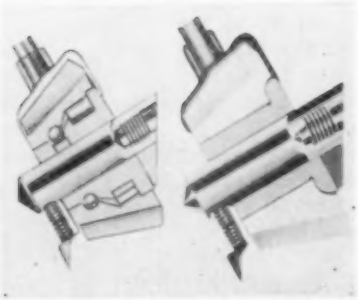
Grant has now made an engineering change in the Model 5480 3-cutter hole enlarger. This valuable tool can be obtained with either the free-running sleeve or combination roller and ball bearing assembly. This marks the first time that this tool has been made with both types of bearing assemblies.

The free-running sleeve bearing is designed for application where heavier weights will be run for a short time. These bearings are precision machined and finished from high-alloy steels for maximum friction-free service in their specific applications.

The combination roller and ball bearing assembly gives its best service where long, continuous drilling under regular string weights is required.

The Grant Model 5480 Hole Enlarger is manufactured in the 3-cutter design and is available in 2 types, the directional and the standard.





The directional hole enlarger will open up a rat-hole off a whipstock without fail. Fixed stinger is an integral part of the body with added strength built into it at the cutter pockets. This combination of short hookup and great strength makes finding the rat-hole easy and eliminates the need for bull-plugs or other attachments which might get lost in the hole. It also features the new exclusive design of the stinger which causes it to walk off a cement plug and keeps the tool from following the mud ring.

The regular hole enlarger is used to open a hole to full gage. The basic design is the same as that of the directional type except that full circulation is provided to a box connection for installing a bit.

Grant Oil Tool Company

A Magnetic Multishot Survey

126 Directional surveying is a must in the orderly development of salt dome production and advisable on bore holes in any type of production.

One advantage of knowing coordinates throughout the hole, that has not attained general recognition, is that of having an accurate target at which to direct a controlled directional hole in case of blow-out. Having these coordinates is like having an insurance policy to minimize a possible loss of inestimable proportions.

The advisability of directional surveying of even so-called straight holes is apparent when it is considered that a hole that is only 1° off vertical may be out from under the rotary table 175 ft at a depth of 10,000 ft.

The best method of directional surveying is that method which obtains maximum accuracy and at the same time consumes the least rig time. That is especially true where rig costs are high, such as on all deep holes and in tidelands operations. The fastest method, and the one most economical of rig time, of making directional surveys of uncased holes is by go-deviling the instrument through the drill pipe and into a non-magnetic drill collar and then making the survey during a regular trip out of the hole.

Survey may be made either on a line or by go-deviling.

Instrument records photographically on strip film with a shorter time interval between records than any other instrument. This feature coupled with other features of advanced design and special developed operational techniques, not only make it more dependable and faster operating than any other instrument, but actual experience has proved time and again that it will function successfully under higher temperature conditions than will any other instrument.

Magnetic Multishot instruments have sufficient capacity to survey the deepest holes with one run into the hole even when making records at the normal intervals of even stand lengths. The instruments are go-deviled in protective casings of 1¾ or 2-in. OD, which will withstand hydrostatic pressures of about 15,000 and 22,000 psi, respectively.

Sperry-Sun Well Surveying Company

Well Logger is Rugged

127 Well Logger detects and records all gas and oil shows, together with the drill rate, on a 24-hr strip chart. Rate of penetration and the gas intensity is recorded side by side on the same chart for comparison. The instrument is self contained, automatic in operation and is portable on roller skids. It is housed in a weather proof housing and is operated on the rig light generator and draws 250 watts. Controls are drill time clutch on the rig floor and the zero control on the recorder.

Gas mixture is water washed and scrubbed before being pulled into the instrument, assuring maximum sensitivity without dew condensation to dampen the results. Platinum filaments are easily replaced and come with the instrument.

Well Logger is in use throughout the world, and is built to operate under rough handling in exploratory work. The changing of charts every 24 hr and winding the clock drive are the only requirements for a day's operation.

Loggers is used to record and detect oil and gas sands, to correlate electric logs, to select drill stem testing points, to warn of gas or an increase of gas in the mud, to determine coring points, etc.

Petroleum Instrument Company

Whip-Stock Can Be Washed In

128 A problem which has plagued the operations of a specialized service in the drilling field for a long time is approaching practical solution through the research of the Great Bend Fishing Tool Company.

The problem: Setting a whipstock for a directional sidetrack after the bit has been pulled up and the walls of the hole have sloughed. The solution: Bottom circulation on the stock.

Because in the past circulation has been possible only at the bit, directional drillers have had difficulty placing the whipstock through cave-ins. To solve this problem, Great Bend is developing 2 different designs. First, a newly designed drilling mill with a circulation hole at the bottom. Second, a tube extending from the mill to the base of the stock which will put the circulation where it is needed.

A special arrangement is built into the assembly which prevents fouling of the circulation extension tube, a problem which prevented the successful operation of such assemblies in the past.

Work on the new mill is progressing at Great Bend's Hobbs, New Mexico, shops.

Great Bend Fishing Tool Company

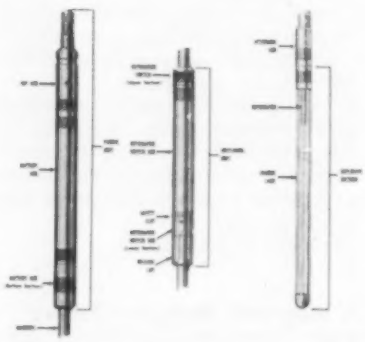
Shot Eliminates Safety Joint

129 Incorporating a revolutionary and unique design for explosive tools for separating stuck drill pipe strings, Bowen Drop Shot does not require wireline or special running tools. It is designed to separate the string of drill pipe at a predetermined point or points.

One unit is sufficient to service several rigs within a reasonable area simply by equipping each drilling string with an inexpensive release sub. In this manner, method is readily available when its use is required. No special running-in equipment is necessary and it eliminates the need of wire line, pipe, or other run-in equipment. Device is an electrical detonating explosive device which is automatically detonated at a predetermined location within the drill string by a self-contained power unit.

Shot is simply dropped down the drill pipe and the disengaging operation is performed in one trip in the hole. The Bowen Drop Shot consists of a self-contained power unit, a switching unit and an explosive section. The explosive charge and detonator components of the explosive section are the only units to be replaced after each run. The result of the detonation has no adverse effect on the other components.

Permitting a full strength drilling string, the Bowen Drop Shot eliminates the necessity of a safety joint, this enabling the operator to make up his drilling string without any loose or unstable connections, and still insures him of the ability to always salvage that portion



of the drilling string above the predetermined separation points.

More than one point can be selected for installation of subs that predetermine the disengaging or separating point. Thus, one Bowen Drop Shot with two release subs will enable the operator to separate his drilling string at more than one point. It is absolutely impossible to detonate the Bowen Drop Shot until it has fallen approximately 200 ft below the surface of the circulating fluid. Further, it is provided with mechanical devices that lock the tool in a safe position, thus danger in handling device prior to dropping it into the hole is eliminated.

S. R. Bowen Company

Anti-Seize Tool Joint Compound

130 One of the principal applications for the improved Led-Plate sealing and anti-seize compound is for tool joints. The suspended lead, which comprises approximately 95 percent of the compound, penetrates deeply to the root of the threads so that the tool joint can be tightened to the limit without fear of galling. This compound has been UL approved for butane, propane, gasoline, and many other petroleum applications in addition to its service as a tool joint compound.

Sample of the improved compound may be obtained for testing upon company request.

Armite Laboratories

New Aluminum Wrench Line

131 The Toledo Pipe Threading Machine Company, has purchased certain assets of The International Forge Company of Chicago, Illinois. A new heavy duty forged aluminum pipe wrench — said to weigh less than half that of a comparable malleable or steel wrench — is being announced simultaneously.

The new Toledo line of heavy duty aluminum wrenches is available in popular sizes 10, 14, 18, 24 and 36 in. Wrenches feature aluminum handle, housing and hook with replaceable forged steel insert jaws and forged heavy duty nut on sizes 10, 14 and 18 in.; and a choice of forged aluminum housing and handle, forged aluminum hook with forged steel replaceable jaw inserts or forged steel hook on 24 and 36-in. sizes. All sizes can be supplied with replaceable insert jaws of beryllium copper, non-sparking, for safety work. Toledo unconditionally guarantees these new wrenches.

The Toledo Pipe Threading Machine Company

Shot Breaks-Up Fish

132 Powerful new K & G Super A-100 Drill Pipe Junk Shot increases capacity for cleaning up larger holes which formerly would have to be side-tracked or abandoned.

Made up of a rugged steel upper sub, bumper sub, and lower expendable body which houses a 10-lb shaped charge, the shot is circulated down on the drill pipe.

Completely safe, the charge can be detonated only by means of an electrical go-devil, which is not placed in the pipe until the shot is located directly on top of the junk, and is ready to shoot.

Expendable body disintegrates when the shot is fired, and the upper sub is recovered with the drill pipe.

Unit is capable of breaking up complete rock bits, slips or other irregular shaped objects which have been lost in the hole. Broken up junk can then be easily recovered with a K & G Magnetic Fishing Tool.

K & G Oil Tool and Service Company, Inc.

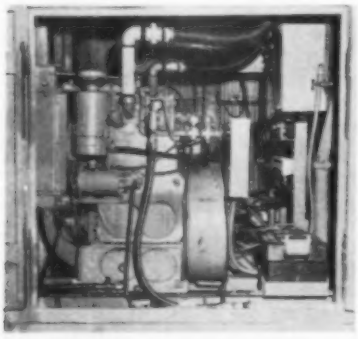
Diesel Powers Fog Horn Package

133 An automatic diesel-air compressor unit, called Dies-l-air, has been developed by Nordberg Manufacturing Company and is being produced by them for Automatic Power, Inc. The compressor unit has a capacity range of 30 cfm at 60 psi delivery and 26 cfm with 100 psi delivery. Unit is designed for service in remote areas where commercial power is not available and rugged, dependable service is required.

Unit consists of a 2 cylinder Nordberg diesel engine, which has one diesel cylinder converted to an air compressing cylinder. Diesel head is replaced by a compressor head but piston and rings are unchanged.

A concentric type compressor valve combines both suction and discharge in a single unit. This valve provides a minimum amount of volumetric clearance in the cylinder and a great degree of accessibility. Entire plate valve assembly can be removed without disturbing cooling water connections or the discharge air hose.

Currently, the principal application of the unit is powering a foghorn for installation on navigational hazards, such as offshore oil well drilling rigs and production platforms. For this type of service, Automatic Power, Inc. uses 2 units and dual automatic engine control. They are housed in a single, compact steel enclosure which is skid mounted and can be readily hoisted and moved from one location to another.



Courtesy Nordberg Manufacturing Company

Automatic Power, Inc.'s automatic control unit is the product of 8 years of development and test work. It will monitor the lubricating oil pressure, jacket water temperature, compressed air volume and engine starting-battery charging circuit. If any one of these exceeds an established safe range, the DAE-10 controls will stop the engine and start the standby unit. An interconnected cooling water system between the 2 engines keeps the standby engine warm for instant starting. The DAE-10 controls not only monitor the engine but an indicator flag will show if any system has exceeded the established safe range. When the serviceman returns after 30 days, he can then quickly make any necessary adjustments or repairs.

The Dies-1-air unit can be adapted to a variety of uses as either an automatic or manually controlled auxiliary air compressor. The DAE-10 controls can also monitor a 5 kw generator unit which will operate in remote areas, unattended for 30 days. Two, one-cylinder Nordberg Power Chief Diesel generator sets replace the Dies-l-air engine-compressors in the steel housing. This entire generator unit is insulated and is suitable for operation in areas with extreme ranges of temperature.
Automatic Power, Inc.

Miniaturized Navigator

134 Hastings-Raydist, Inc., announces a new Raydist position indicator (navigator) aimed directly at many applications requiring light, portable units. Specifically designed for use in helicopters, light planes and for man-packed applications, new navigator is packaged as 4 separate units but mounted in 1 case, complete with battery unit (optional), whip antenna, and handle for easy carrying.

Two small indicator units, weighing less than 2 lb each, furnish accurate position data with respect to corresponding shore or base stations. Center cabinet, weighing 16 lb, contains all electronic circuitry. Lower cabinet, marked power supply, contains dry-cell batteries sufficient for 17 hours of operation. Battery supply weighs 20 lb and is not necessary where a 24-v d-c source is obtainable.

On rear of case is a collapsible whip antenna and also provision for attachment to external antennas when used in helicopters, aircraft or vehicles where such antennas are available and desirable.

New line of lightweight indicators offers a neat and practical solution to the helicopter navigation problem and simultaneously will find greater use in the aerial and ground surveying field.
Hastings-Raydist, Inc.

Light-Weight Hydrographic Recorder

135 An all-purpose, light-weight, portable depth recorder for use in hydrographic survey work is found in Bludworth Marine's new Model ES-130, which includes the latest electronic improvements and performs with flexibility and precision.

In normal operation the transducer and mounting tube combination may be hand-held over the side of a small boat or secured by other means. For fishing or other small boat use a special adapter is available for mounting the transducer to the hull.

Complete equipment, less power source, weighs less than 40 lb, the recorder unit case being so designed that the sectionalized mounting tube, transducer and cable stow inside the case when not in use.

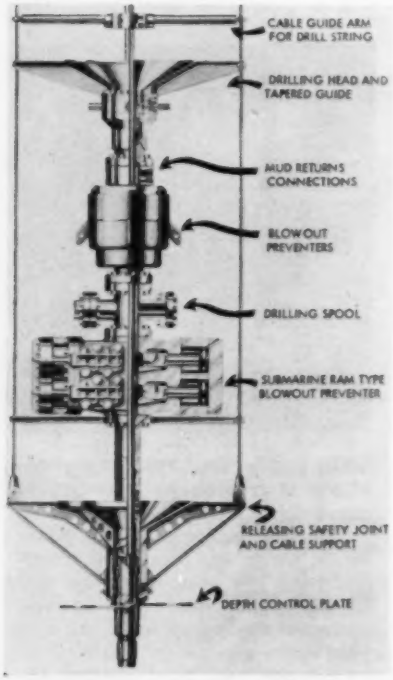
Operating on a fixed acoustic frequency within the band 200 to 220 kc, unit has a depth range to 245 ft with 4 scale ranges of 65 ft each. Recordings are displayed on paper with over 7 in. of useful range. System will plainly record a depth within 2 ft of the transducer face.

The equipment is basically designed to a sound propagation velocity of 4800 ft per sec and will give an accuracy of plus or minus ½ of 1 percent when operated at normal battery voltage or 6.3 or 12.6 d-c or 115-v a-c, 60 cycles, single phase; neglecting sound propagation changes.
Bludworth Marine, Division of Kearfott Company, Inc.

Tools Revolutionize Offshore Drilling

136 One of the important oilfield developments of recent years is a new underwater drilling technique using equipment developed by Shaffer Tool Works. This equipment and the procedures it makes possible permit the drilling of exploratory wells beneath the surfaces of oceans, lakes, rivers, bays, and other bodies of water without need for costly drilling platforms or man-made "islands." Instead, drilling is conducted from relatively inexpensive barges, converted LSM's and other similar craft. No difficult operations are required and the entire technique can be readily handled by any crew experienced in conventional land-based operations.

In this new method, the wellhead equipment is placed on the ocean floor, and guide cables between the


CABLE GUIDE ARM FOR DRILL STRING
DRILLING HEAD AND TAPERED GUIDE
MUD RETURNS CONNECTIONS
BLOWOUT PREVENTERS
DRILLING SPOOL
SUBMARINE RAM TYPE BLOWOUT PREVENTER
RELEASING SAFETY JOINT AND CABLE SUPPORT
DEPTH CONTROL PLATE

wellhead equipment and the floating vessel permit drilling and testing tools to be run in and out of the well under full control of the operator on the rig floor. The entire procedure has proved itself, not only in protected bays and lakes, but also in the open ocean.

Accompanying illustration shows the Shaffer Hook-up that makes this new drilling technique possible. From the bottom up, it consists of (1) the Shaffer Right-Hand Torque Releasing Safety Joint which provides a simplified means of connecting the wellhead equipment to the top of the casing string, and of disconnecting this equipment whenever desired during installation and drilling operations, (2) the Shaffer Submarine Hydraulic Double Control Gate which provides means for closing off the open hole against entry of sea water and also for packing off around the drill string, with all operations controlled through hydraulic lines from the floating vessel, (3) the Shaffer Submarine Drilling Head which maintains a pressure-tight seal around the drill string whether it is rotating, being raised or lowered, or is stationary, and (4) the Guide Cable Assembly which is connected between the hook-up and a constant-tension drum on the drilling barge to provide a positive means of guiding the tools between the barge and wellhead. In addition to this hook-up on the ocean floor other key Shaffer equipment includes the Shaffer Oil-Sealed Drilling Bumper Sub placed in the drill string to compensate for wave action, and the Shaffer Type 55 Kelly Cock which is placed in the drill string at rig level to simplify cementing operations. Remainder of the equipment (with the exception of the floating rig, of course) is the same as that used for conventional land-based drilling procedures.

After drilling and testing operations are completed, all of the equipment may be recovered with the exception of the lower portion of the Safety Joint, which remains on the ocean floor, attached to the cemented casing string.

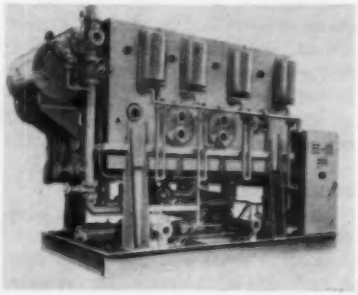
In addition to being simple, quick and relatively low in cost, the new Shaffer Sub-Sea Drilling Procedure also provides other important advantages. Because (1) the wellhead equipment is anchored on the ocean floor, it is not subjected to the destructive buffeting of surface waves and therefore offers greater protection against damage during storms or rough water conditions; (2) because the drilling operations are conducted from a floating vessel, the foundation problems of supporting equipment on unpredictable underwater strata are eliminated; (3) upon completion of the exploratory operations, the only projection above the ocean floor is a few inches of the Safety Joint mandrel. There are no hazards to navigation, as with man-made "islands," nor are there any costly clean-up operations to safeguard future water traffic.

Shaffer Tool Works

Fresh Water from Waste Heat

137 Every offshore drilling rig and tender can produce its own fresh water on board at low cost through waste heat evaporators. Operating at zero cost for fuel, evaporators put waste heat in the diesel engine cooling water to work. Up to 575 bbl of fresh water per day can be produced with a total load of approximately 1500 hp — fresh water is produced in direct proportion to engine horsepower. Units are widely used to produce fresh water for drilling mud make up, drinking, bathing and cooking.

Here's how the waste heat evaporator works: Sea water is circulated through the evaporator condensing coils where it picks up heat from condensing fresh water. This creates a vacuum in flashing chambers. Then the warmed sea water, circulating through engine jacket water cooling exchangers, enters evaporator vacuum chamber and flashes into steam. Steam passes over condensing coils, condenses and is removed as distilled water.



No adjustments are necessary on the Cleaver-Brooks evaporator. Experience on rigs now operating in the gulf proves that the evaporator operates continuously without frequent shutdown for scaling. Water does not boil on tube surfaces. Operation is at low temperature and low pressure so that scaling is radically reduced. Typical operating cost is approximately a penny per gallon.

Present installations with diesel engines can be converted quickly to produce water on board. Advantages of the Cleaver-Brooks waste heat evaporator aboard rigs miles from shore are apparent since weather cannot interrupt the supply of fresh water. Water is pure. Low cost operation and water in direct proportion to diesel power available means that production and cost of water can be easily calculated.

Cleaver-Brooks Company

Giant Wire Rope Sling

138 Giant in wire rope slings, 3 in. in diameter and furnished with the patented Dualoc Ending, have been perfected by the Wire Rope Division, American Chain & Cable Company, Inc. The manufacturer recommends its use to fill a vital need in today's expanding materials handling programs for moving heavy equipment.

As loads become larger and heavier, the demands for larger "lifting tools" or slings to handle those loads become increasingly acute. In offshore drilling, for example, whole derrick platforms may be positioned and anchored with wire rope slings.

New sling, with its fully mechanical Dualoc Ending, is said to be the world's largest. It presents a striking contrast to its smaller counterpart, the ¼-in. wire rope sling, and illustrates the largest and smallest sizes in ACCO's line with some 19 diameters.

The Dualoc ending eliminates tucking, crushing or distortion of the sling body, therefore no strength is lost in the splice. Collars are applied merely to hold the wire ending in position. Full holding power is developed by the wire rope strands of the dead end binding around and against the live end in the wrapped section.

Fabricated from 3-in. diameter 6 by 37 Preformed Improved Plow Steel IWRC (independent wire rope core) wire rope, the sling's breaking strength is rated at 720,000 lb with a safe working load of 144,000 lb or 72 tons. Sling assembly is proof tested to 288,000 lb, double the safe working load, at the manufacturer's plant with their 300 ton capacity hydraulic testing unit. To protect against the possibility of human error, every sling in its completed form is submitted to and must withstand, without distortion in any part, an actual certified proof test equal to two times the rated capacity of the sling.

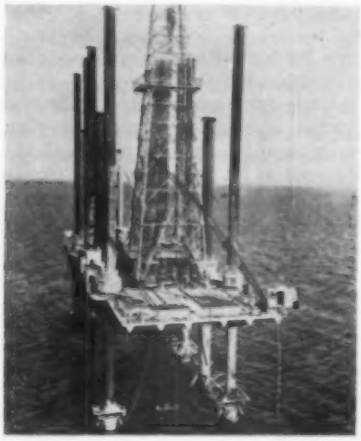
American Chain & Cable Company, Inc.

Crane Goes Offshore

139 Among the most important new petroleum applications of the Lorain Crane is its adaptions to offshore operation requirements. Called Lorain Offshore Cranes, various models are designed for installation on mobile drilling platforms, permanent platforms, tenders and barges for handling mud, materials, pipe, personnel and supplies of all kinds. A wide selection of capacities from 7 to 75 tons and 4 models are available for offshore installation.

Units feature shear-ball mounting that eliminates all turntable rollers or shoes, center pin and nut, and centering gudgeon; metered air 2 lever controls, and square-tubular chord boom that gives greater lifting capacities and use of longer booms at flater angles.

The Thew Shovel Company



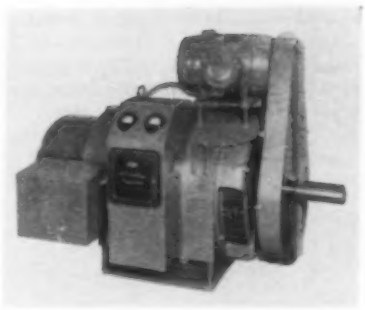
Offshore Generator Features Safety

140 Electric power requirements aboard offshore drilling rigs are unique. Since a fire or explosion aboard a rig would be disastrous, maximum efforts are made to reduce fire hazards.

Electric Machinery Manufacturing Company has developed a generator for offshore use with 2 important new features. Machine is offered with a top mounted belted exciter. This exciter is an explosion-proof unit and is electrically connected to the generator with explosion-proof fittings.

Collector rings of this machine are enclosed in a heavy cast steel enclosure. Enclosure is complete. Any collector ring arcing is thus confined. Enclosing the collector rings, which are brass, limits the corrosive effect of sea air. Consequently, life of collector rings comes closer to the life expected of rings in a normal atmosphere.

Effect of enclosing the exciter and the collector rings is to make this generator suitable for offshore use. Machine has found acceptance on the offshore drilling rigs both as primary sources of power and power for auxiliary systems.



This type of construction satisfies a drilling rig's requirements yet does it without wasting space and at a realistic first cost.

Electric Machinery Manufacturing Company

Derrick is Special for Offshore

141 A new multiple-well derrick for offshore drilling has been announced by The Parkersburg Rig and Reel Company. By an ingenuious method of rolling the crown block on wheels operating on trussed headers above the water table beams, 3 wells can be drilled in a line. The block can then be lifted with the gin pole hoist and positioned for another line of 3 wells.

Six-well derrick is 1 in a line of 3 derricks and substructures designed specifically for offshore operations by Parkersburg. Line is known as the "Galemaster" series.

The 6-well derrick features a gable-type adaption of pyramid gin pole to reduce weight on water table opening and provide greater safety. Gin pole lift capacity is 20,000 lb. Derrick is available in heights of 140 and 147 ft with base 40 by 45 ft. Working load capacity is 850,000 lb, hook load capacity 320 tons. Windload rating, bare derrick, is 115 mph; with pipe setback, 100 mph.

Derrick legs use twin 8 by 8-in. angles properly connected to distribute loads to both angles.

To shift block position from one well location to another, jack screws are tightened to force wheels down against top flanges of water table beams and raise crown block supports. All weight is transferred from crown block supports to wheels. Come-alongs are attached to holes at bottom of crown block support beam web stiffeners and the entire assembly is ready to be safely and easily shifted.

Arrangement of cross-over sheave guides the fast line from center line of derrick to correct position above either row of wells.

Substructure for the multiple-well

derrick is available in either 6-post or 12-post types with floor heights of 23 ft and 16 ft 1 in. Six-post type is on 45 ft skid centers while the 12-post type is on 40 ft centers. Trolley beams are furnished for handling equipment used beneath the substructure.
Parkersburg Rig and Reel Company

Offshore Kit for Mud Testing

142 A new portable offshore kit for determining the physical and chemical properties of drilling mud being used on offshore drilling rigs has been designed and manufactured by Magnet Cove Barium Corporation.

Kit contains all the equipment necessary for a complete mud check, including the glassware and chemicals for running pilot tests with various treating agents. Solutions used in making necessary chemical analysis of drilling mud are bottled in non-breakable polyethylene containers.

The most important features of the unit are the viscosimeter, an instrument essential for the measurement of flow properties of mud, and a specially designed "Powr Pak" which is built into the kit. The "Powr Pak" converts either 120-v a-c or d-c current to the 12 v needed for operation of the viscosimeter and eliminates the necessity of transporting the heavy storage battery formerly used as the power source.

Also, a new plastic mud funnel has been developed for use in checking the

viscosity of drilling muds at the rig. It was designed to meet the specifications of the Marsh funnel viscosimeter described in API Code RP-29.

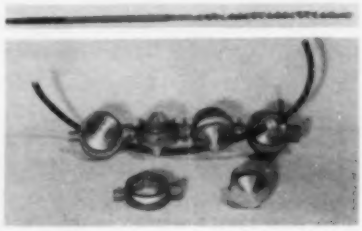
Funnel is made of a plastic molded material that withstands both high and low extremes of temperature. Because of its low heat transfer, it permits easy handling of hot muds.
Equipment Department, Magnet Cove Barium Corporation

Gun Packs Remarkable Power

143 A new expendable tubing gun for permanent type well completions, the Super "Mighty Mouse"®, was recently introduced to the oil industry. This new gun is already in field-use in the United States, Canada, Venezuela, Germany, Saudi Arabia and Mexico, and has proved one of the most effective perforators for thru-tubing perforating, as well as completion in small liners, drill collars, drill pipe and tubing.

Super "Mighty Mouse" tubing guns, in 1¾ and 2⅛-in. OD sizes, possess remarkable penetrating power for guns of such small diameter. The power of the 1¾-in. gun approaches that of conventional 4-in. guns; while the power of the 2⅛-in. gun actually exceeds the performance of conventional 4-in. guns.

As shown in the illustration, PGAC's new gun is composed of individually-



cased shaped charges mounted in aluminum die-cast links. Charges in these guns are designed to withstand 15,000 psi hydrostatic pressure. All expendable material is frangible aluminum.

Not withstanding its remarkable power, the Super "Mighty Mouse" eliminates some serious problems. First, with PGAC's new gun, the debris remaining after perforating is broken into small pieces which settle to the bottom and do not form bridges in the perforated interval to interfere with subsequent operations. Second, since these guns require no actuation of charges or switches to fire, most of the operational problems with guns requiring such actuation have been eliminated.

Super "Mighty Mouse" tubing guns have other distinct advantages. One is that perforations are completely free of any "carrot" or other plugging matter, so each perforation provides 100 percent drainage flow.

Another advantage is that string may be assembled in any length desired, and blank intervals may be inserted as desired so that multiple zones may be perforated on one run.

These new guns are rugged enough to spud to get down in heavy mud or through bridges, yet the carrier links are flexible enough to pass through bent or kinked tubing. Also, the large fluid by-pass area around the charges facilitates running the gun through tubing constrictions.

All guns are run with a sensitive magnetic collar locator for depth correlation.
Perforating Guns Atlas Corporation

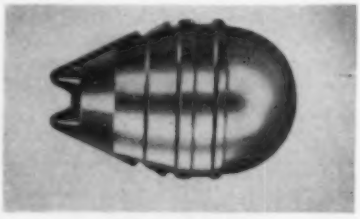
Glass Jet is Carrot-Free

144 A major advantage of McCullough Glass Jet Units is that slugs, carrots and other debris, usually considered to be a natural result of jet perforating, have been eliminated.

When a McCullough Glass Jet is fired the entire liner is atomized, forming a particle loaded, deep penetrating jet stream. The jet stream has a very high velocity that assures that the metal particles of the atomized liner will not pile up along their distance of travel to form a metal slug or carrot.

In addition, the body of a Glass Jet Unit completely disintegrates into a very fine powder — harmless to the well and to the penetrated formation. It completely eliminates fragments of junk — metal, rubber or synthetic material — usually associated with other jet processes.

Glass Jet Units are of exclusive McCullough design and manufacture, more powerful than the usual shaped charge of a comparable size. The advantages they offer are: Deepest penetration; larger, more uniform hole size; the elimination of metal carrots, slugs and other debris; resistance to tempera-



tues over 350 F and have been tested to withstand 20,000 psi.

Glass Jet containers are made of a special type glass to provide great strength and high resistance to shock. Each Glass Jet Unit is loaded, hermetically sealed and must pass rigid inspection. The sealed units are moisture proof even under high pressure.

The power of the Glass Jet is concentrated in the penetrating, particle loaded jet stream and not expended worthlessly in the casing. This also increases the safety factor in relation to the well casing.
McCullough Tool Company

Two Thousand Fracturing Horsepower

145 Dowell Incorporated has given its new Double-Allison Centrifugal pumping unit its initial oilfield test when it was used to help inject 120,000 gal of water and 60,000 lb of sand into a Kearny County, Kansas, gas well.

New bob-tail pumper, with its two V-1710 modified Allison aircraft engines, proved it will be powerful medicine on future high-volume, low-pressure treatments. Pumping through 4-in. pipe, the average injection rate for this single unit was 41 bbl of water per min at 1000 lb per in. surface pressure.

Power output of Dowell's new unit was 2000 gross hp. It's overall mechanical efficiency was 60 percent, which means that the gross engine horsepower was converted into 1208 hydraulic hp at the pumps.

Unit's 2 high-speed centrifugal pumps have handled up to 80 bbl of water per min at 850 psi in tests at Dowell's proving ground. Exact maximum volumes of fluids other than water the unit can handle are not yet known.

The big "Riverfrac" job was engineered by Dowell to increase gas production from the Herington-Krider section of the Hugoton Pay Series. The pumping time was less than 40 min, with all the water and sand being injected at an average rate of 75 bbl per min (3150 gal per min).

The new centrifugal pumper's 41 bbl-per-min rate represent over ½ the total pumping capacity. The balance of the overall injection rate was accounted for by 2 regular Allison pumpers, which also handled all of the sand.

The Double-Allison unit's 2 pumps may be hooked up either in parallel, or series. For maximum volume at pressures below 1000 psi, parallel hook-up is used. Above 1000 psi, the pumps are hooked up in series. Pumper's maximum pressure rating is 2100 psi.

For the present, fluids containing sand cannot be handled by the new pumper. However, on fracturing jobs where sand is used, it can be introduced into the fluid at the well head with a reciprocating pump unit, or be injected through other conventional pumping units. Experiments with new metal alloys are being continued in an effort to develop pumps for the new unit capable of handling abrasive fluids.

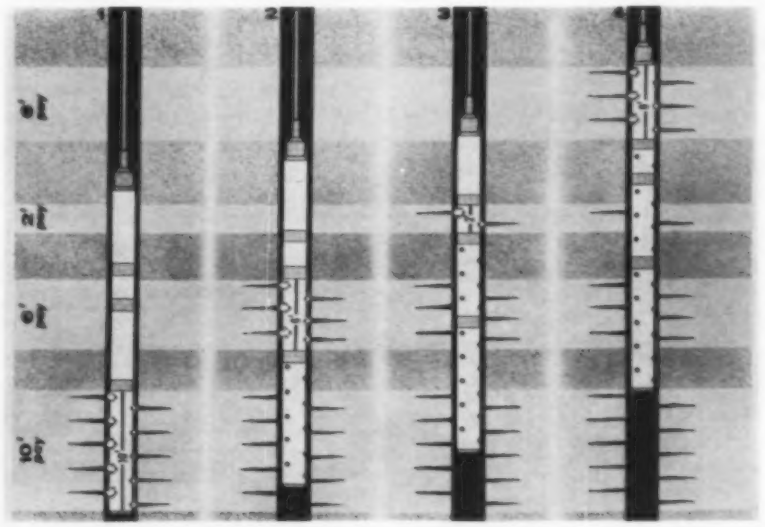
Dowell Incorporated

Jet Guns Selective-Fired

146 A method of selectively firing a series of jet guns on one run into the hole has been perfected and introduced by The Western Company.

Selective Rocket Jet permits a number of jet gun sections of various lengths to be connected together and fired individually at the desired perforating zones. This selective firing process has many applications, all resulting in substantial time savings and economies: (1) Several isolated zones can be perforated on one run into the hole. (2) A long single zone can be perforated in fewer runs without subjecting the well to excessive explosive forces. Customarily, jet perforating has been limited to 16-20 ft on one run to avoid excessive shock. With Selective Rocket Jet, longer gun sections may be run into the well, with limited footage fired at one time to reduce shock. (3) High perforation densities can be provided by reperforating the same zone on one run. (4) Solid zones can be perforated without leaving objectionable blank areas within the perforated interval. Such blanks are left with conventional perforating due to the connecting subs used to join separate gun sections. With selective firing, these blanks are eliminated by repositioning the tool after each gun section is fired.

Selective Rocket Jet employs an entirely new concept in perforating control. Any number of jet gun sections can be run into the well at one time and fired individually as desired. Operation of the tool can be checked with surface instrumentation after each section is fired to insure that the firing circuit is operative. Each gun section uses bottom hole firing assembly to prevent detonation of wet guns.



Typical application of selective jet is shown in diagram. Guns of varying lengths are rigged in sequence to match zones to be perforated.

Positioning of the gun can be checked with either magnetic casing collar locators or with collar wires. Individual gun sections cannot be fired out of proper sequence. Tool employs components which are simple, sturdy and completely reliable.

Selective Rocket Jet is available in 4 and 5-in. OD steel carriers. Gun sections may be loaded from 1 to 6-per-ft densities and employ standard charges used throughout the industry. Rocket J-11 charges may be used in the 4-in. OD guns.

The Western Company

Equipment

Improvements Made in Cementing

147 Cementing of deep wells frequently requires that the weight of cement be heavier than, or at least equal to, the weight of the drilling fluids being used in the hole at the time of cementing. Many times this requires the use of cement slurries weighing 17 to 19 lb per gal. Research has lead to the discovery of a new material for this purpose called "Hi Dense No. 2." This is an illmenite ore having a specific gravity of 4.7 and a uniform fineness requiring very little water for wetting.

This new weight material has a uniform particle size between 30 and 100 mesh. It has low water requirements for wetting and therefore takes very little additive to give the desired weight. Hi Dense No. 2 does not effect the pumpability of the cement slurry and the increase in solids ratio will give a slight increase in compressive strength of the set cement. Laboratory data indicates that it is compatable with all types of cementing composition presently in use in deep hot wells.

Following table illustrates the comparative quantities of different weighting agents to give heavy weight cementing slurries.

Other improvements in cementing being introduced by Halliburton Oil Well Cementing Company include a new type wall cleaner and a new caliper-volume survey service.

The Howco Recipo Wall Cleaner is composed of a number of tough claw-like rubber fingers molded to a steel collar. End design of the fingers consists of 3 prongs which are the cleaning elements contacting the wall of the hole. While traveling down the hole to desired location for cleaning, the fingers

relax from contact with the wall so that filter cake is not disturbed. Where reciprocation begins, the contact between the wall of the hole and the fingers will cause the fingers to turn down as the casing is raised. This causes the 2 inner prongs of each finger to exert considerable cleaning force on the filter cake.

Spacing of the fingers around the cleaner is such that the velocity surge between the fingers aids in scouring the wall to remove the loosened filter cake.

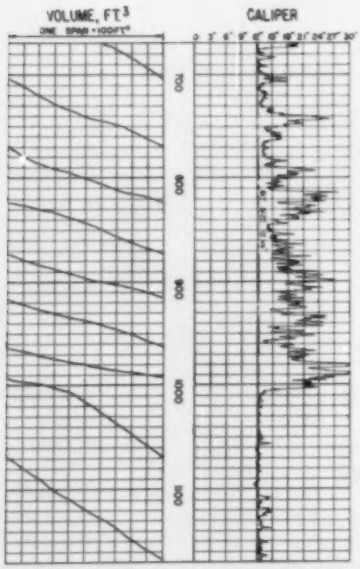
For many years Caliper Surveys have been used to calculate the hole volume from one depth to another.

To speed calculations and improve the accuracy of hole caliper results Halliburton has developed a continuous volume recording computer. It is a precision ball and disc integrator with an accuracy of 2 percent and is actuated by the caliper signal and the depth recording signal and provides an accumulative integration of depth and diameter. The results are presented as a galvanometer trace which re-cycles every 100 cu ft. Since each cycle is divided into 10 divisions volumes can be ascertained for any interval with ease.

Halliburton Oil Well Cementing Company

Table I — Required Amounts of Different Additives for Heavy Weight Cement Slurries
Pounds per Sack — Retarded Cements

Additive	Specific Gravity	Slurry Weight—Lb per Gal 17.0	17.5	18.00	19.0
Hi Dense No. 2	4.70	12	20	28	46
Ottawa Sand	2.63	28	51	79	—
Regular Barite	4.30	22	37	55	103
Coarse Barite	4.30	18	34	51	93
G-7 Mud Additive	7.00	12	21	31	52



Caliper survey with volume recording is used to determine volume of cement required. In example, volume required between 900 and 1100 ft can be readily read as 370 cu ft.

Rotating Assembly for Open Hole Plugs

148 Practice of placing cement plugs in open hole through bare drill pipe has resulted in a reported 50 percent ratio of failures. The highest percentage of plug failures results from incomplete mud displacement (50 to 60 percent) by the small amount of cement slurry required for an average plug. Hole conditioning using rotating scratchers is a natural, straight-forward approach to placement of cement plugs in open hole. The B and W Rotating Scratcher Open Hole Plugging Assembly has three major functions: (1) It conditions the hole by putting all fluid mud, gelled mud and mud cake into the circulation stream. (2) Creates major turbulence and spreads the cement slurry during the critical 2 minutes required to place the cement slurry. (3) Removes mud cake from sand face to permit complete bonding with formation. The B and W Plugging Assembly (rotating type) is designed to cover 6 joints (180 ft) of tubing or drill pipe and includes: 36 drill pipe clamps, 30 rotating scratchers — multi-flex type, and 3 latch-on centralizers. Use of centralizers prevents whipping of the drill pipe and protects the equipment during the one hour (more or less) that the drill pipe is rotated at about 25 rpm.

B and W Drill Pipe Clamps which lock into the base plates of the rotating scratcher units are used to hold them firmly in place without welding.

Assembly can be made up on the casing rack or at the rotary table. It is run to the selected depth after which circulation and rotation are established. Following a short pumping period (15 to 30 minutes), the cement slurry is mixed and pumped down. Rotation continues until the cement is in position and for a few minutes thereafter to puddle and better distribute the cement against the cleaned formation.

Sufficient drill pipe should immediately be pulled to clear the top of the cement, and circulation re-established if necessary to wash out excess cement.

B and W, Incorporated

Circulating Fill-Up Equipment

149 In addition to filling the casing automatically from the bottom as it is being run, the new Circulating Flexiflow Fill-Up Collar permits circulation to be carried on at any time while running-in casing.

Use of Collar (Product No. 161-D M&F, Fig. 1) eliminates high-pressure surges that might otherwise break down a weak zone or mud-off a producing zone. It fills the casing automatically as it is run, and allows circulation at any time while running-in. And it contains a back-pressure valve that can be brought into action for cementing by merely pumping a Bakelite Ball down the casing to the collar.

It has been found that under certain clearances, such as 7-in. casing run in an 8¾-in. open hole, pressure surges over 5000 psi can be created each time a joint of casing equipped with conventional floating equipment is

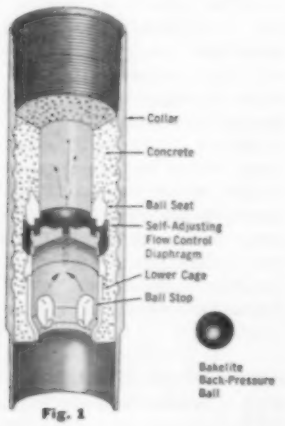


Fig. 1

lowered. Pressures of this magnitude are in the high-squeeze-pressure range, and can severely damage many formations.

With the new Baker Circulating Flexiflow Fill-Up Collar, the casing can be lowered at normal rates while protecting low-pressure, permeable zones from damaging pressure surges.

Unit features a self-adjusting flow control diaphragm that acts automatically to reduce pressure surges and to provide controlled filling of the casing. When casing is lowered in the well, increase in pressure from below causes the small hole located in the center of the diaphragm to open up and permit a large volume of fluid to enter the casing (Fig. 2).

When downward movement of the casing is slowed down, hole in the diaphragm contracts to normal size to prevent over-filling. This action of the

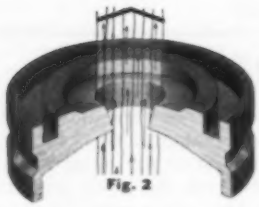


Fig. 2

Fig. 3

Fig. 4

Fig. 5

variable valve in opening wider and closing down synchronizes the rate of filling the casing with the rate of lowering, and in so doing provides maximum relief from pressure surges. Reducing surges to a minimum helps prevent costly circulation losses, reduce mudding-off, and eliminate fracturing as a cause of primary cementing job failure. In addition, it is possible to circulate at any time while running-in.

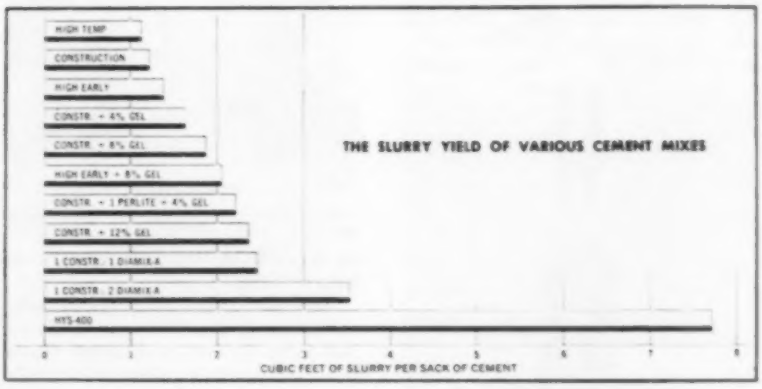
An effective back-pressure valve for cementing is easily provided before the cement is pumped in, by dropping a Bakelite ball into the casing, and then applying approximately 200 psi force to pass this ball through the flow control diaphragm (Fig. 4). Once the ball is pumped into the lower cage, the diaphragm functions as the seat for the back-pressure valve. Once the ball is forced through the diaphragm, it remains in the lower cage.

Baker Oil Tools, Inc.

Slurry Offers 7 Times Yield

150 BJ Service, Inc. is now offering a new cement slurry, HYS-400, which claims 7 times the slurry yield of conventional cement. In addition to high yield, this slurry emphasizes exceptional overall properties including: (1) Strength in one day. (2) A low density rating of 10.8 lb per gal as compared to 15.6 lb per gal for regular cement. This low density is valuable in cementing jobs where incompetent formations are a problem. (3) Low permeability comparable to construction cement. (4) Low fluid loss. (5) Reduced mud contamination with high alkalinity and minimum free lime. (6) High resistance to corrosion with exceptional permanency in bond.

BJ Service, Inc., a subsidiary of Borg-Warner Corporation



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Equipment

Self-Setting Bridging Plug

151 The first self-setting bridging plug for oil wells is being manufactured by the Aerojet-General Corporation.

Plug eliminates the setting tool, which must be disassembled and maintained. Instead, the plug itself, only about 3 ft long, is attached directly to the suspending cable which automatically releases as the plug is set. Running head on the plug can be made to fit any kind of electric cable now in use.

Force to set the plug is provided by a slow-burning propellant in solid form, developed in Aerojet's laboratories.

Solid propellant developed for the bridging plug has a high safety factor. It is impervious to shock, and burns only under pressure. In the plug the necessary pressure is provided at the moment of firing by a small initiator. Firing is electrical.

Plug has slips at top and bottom, with a heavy rubber packer between. A tube in the top receives the solid propellant, about the size of a short segment of broomstick. The conventional ignition wire is grounded against the side of the tube. The cable support and release are attached to the plug by a shear pin. Plug and propellant are shipped and handled separately; fueling requires only a moment at the well head.

When the ignition switch is closed, gas pressure forces upper and lower slips toward each other, expanding them and expanding the rubber under heavy compression to form a sealing ring between the slips. When that has been accomplished, in 15 to 20 seconds, the shear pin is severed automatically and the cable support released. This action vents the gas within the plug. The only part retrieved is the firing head.

A smaller single-slip type plug also is available for special applications.

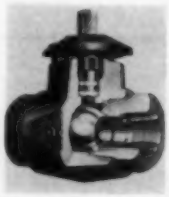
The bridging plug, of cast iron, is readily drillable with coventional bits.

The self-setting bridging plug will be distributed by Bowen-ITCO of Houston, Texas.

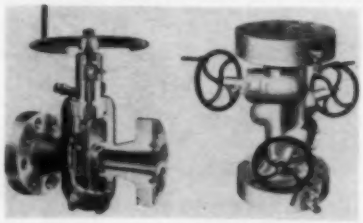
Aerojet-General Corporation

Three New Valves Announced

152 For oilfield services W-K-M now offers a triple completion valve similar to their well-known dual completion valves. Three 2-in., through-conduit gate valves are incorporated in a single body. New valve is available in API working pressures of 2000, 3000 and 5000 psi. All parts are interchangeable with standard W-K-M production valves and feature pressure seal bonnets, double-row thrust bearings, parallel expanding gates, closed packing boxes and superfinished stems.



Specifically designed for use on



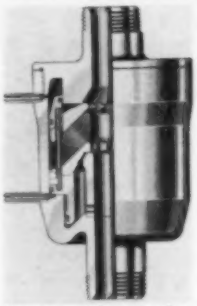
Christmas tree wing installations is the new W-K-M 2-in. reduced port valve. This valve has the same basic features as have all the W-K-M valves for oilfield services.

New addition to the company's plug valve line is the ACF non-lubricated ball valve. Valves are available in cast iron and carbon steel in sizes ½ through 6 in., ASA 150 and 300 lb, 200 and 400 lb WOG. Special features of the ball valve are round full-pipe area, leakproof 2-way seal, quarter-turn opening and closing, fully protected seating surfaces, chrome plated ball for extra resistance to wear and corrosion, and minimum number of parts with resulting minimum maintenance.

W-K-M, Division of ACF Industries, Inc.

Wire Line Blowout Preventer

153 Regan conical wire line blowout preventer was designed to satisfy the demand for a device that would assure complete control of an oil well where extremely high pressures were encountered while running tools or instruments on a wire line.



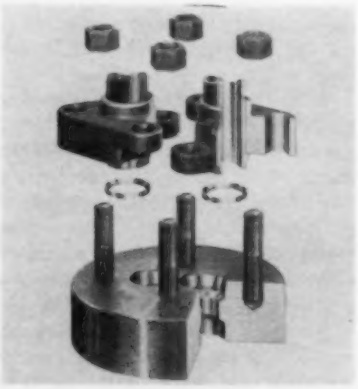
Blowout preventer is generally furnished with standard tubing tions and is tested to 10,000 psi, both at full closure and around a wire line.

Illustration explains the construction of the piston assembly. It consists of a rubber member conical in shape, upper and lower plate, and a series of alloy steel supporting fingers. As the piston assembly moves up within the housing the rubber member is made to flatten out, causing the inside diameter of the rubber to become progressively smaller until a complete closure is effected. At the same time the rubber is being closed, the fingers move in support of the rubber both on the upper and lower surfaces.

Regan Forge and Engineering Co.

Delta Flange Strengthens Duals

154 New delta flange that increases the strength of dual completion Christmas trees and decreases maintenance problems has been developed by the Oil Center Tool Company.



The O-C-T Delta Flange solves the problem caused by unbalanced flanges. The latter tend to "Y" out under pressure. This aggravates leakage problems and sometimes necessitates expensive

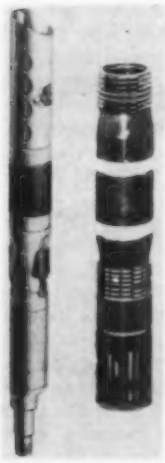
extra bracing to hold dual strings together.

New flange, used with Laurent seal rings, keeps the pressure area at a minimum and makes possible a perfectly-balanced, leak-free tree. The flange is unusually strong because each half is supported in balance by 3 equally spaced studs and nuts.

Delta flanges serve as foundations for threaded or threaded and welded Christmas tree assemblies. The flanges are available in 1½, 1¾ and 2-in. sizes in 4000 and 6000-lb test pressures.
Oil Center Tool Company

Packers for Permanent Completions and Duals

155 Guiberson now offers the Type A drillable packer for permanent completions and a Type RD retrievable dual string packer. Type A



can be set and placed in production with only one-half tubing trip — a tremendous saving in time and money. Spacing problems are minimized when packer is run on tubing. Field tests have proved that most installations can be computed and set as accurately and quickly as with ordinary compression set hook wall packers.

The Type A is constructed of easily drillable, corrosion resistant materials — for the most part, cast iron, lead-alloy, rubber and brass. While running, all parts are rigidly attached to and carried by the stinger. Any impact or drag encountered is transmitted solidly to the stinger and does not tend to set the packer.

Packer may be set by wire line when desirable and is offered in a wide range of casing sizes. It is available with an integral tail pipe that may be fitted with a tubing valve landing nipple or sleeve type tubing valve for zone isolation purposes. It is also available less flapper valve.

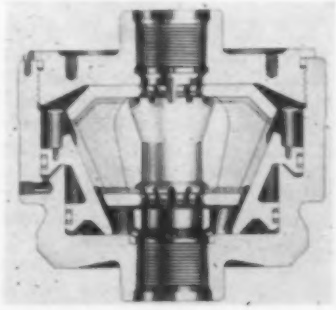
Available with or without hold down anchor, Type RD retrievable dual string packers are designed to operate in wells of any depth. Exclusive features are an all-steel head and heat-treated alloy steel slips, dove-tailed for safe, smooth operation.

Available sizes are 5½ by 1¼ by 1¼ in., 5½ by 1½ by 1½ in., 6⅝ by 2-in. EUE by 1½-in. upset, 7, 7⅝ or 9⅝ by 2 by 2-in. EUE, 9⅝ by 2½ by 2½-in. EUE in a full range of casing weights. An optional tension release arrangement is offered which allows the primary string to be retrieved for servicing gas lift valves, etc., without disturbing the packer. Tension values for 5½ in. are 6000, 9000, 12,000 and 15,000 lb. Tension values for 6⅝ to 9⅝ in. are 9000, 12,000, 16,000 and 20,000 lb. Rental tools are available to retrieve the packer when desired. A choice of plain, jay hook, or snap ring secondary string stingers is offered.

Field reports indicate an exceptionally successful dial zone arrangement utilizes the Type A drillable as the lower packer, the Type RD as the upper packer and with tubing joints opposite perforations fully covered with Guiberson tubing protector rubbers. This combination may be assembled above ground, run in the well, the packers set, completion operations performed, and the well placed on production without removing the tubing from the well.
The Guiberson Corporation

Small Blowout Preventer

156 Hydril Type "GKS" Wire Line Stripper and Blowout Preventer is a safety device for small OD tubing or wire line tools run in high pressure wells. Equipped with Hydril's cartridge-type packing element which packs off around any diameter that will pass through its bore, small-diameter tools, wire lines and small OD tubing can be stripped through the closed packing element with ease. Packing element also acts as a master gate for closing off the open hole and easily



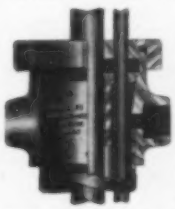
holds well pressures equal to the maximum service pressure rating of the body assembly.

The GKS-2-900 and 2-1500 Wire Line Stripper is regularly furnished with a top and bottom connection threaded with an API 2⅞-in. OD external upset, female tubing thread.

These units are also available with bodies and heads having API flange connections for 3000 and 5000-lb service pressure ratings.
Hydril Company

Well Treating Tubing Head

157 Type E7C-MAC Tubing Head, used by oil producers who are treating well fluid with hot oil to remove paraffin, is a modified version of



the basic Hercules Type E7-C Tubing Head. The body and cap are interchangeable in both heads, resulting in easy conversion of one head to the other by using the appropriate internal parts.

It consists of a pressure cast steel body, tested to 2000 psi; heat-treated, self-aligning hinged slips which permit macaroni string to run close to tubing, and simultaneous packing-off of the tubing and macaroni strings with heat- and oil-resistant Neoprene packing rings.

Tubing head is available in 7-in. OD casing size only, to suspend 2 or 2½-in. EUE tubing and ¾ or 1-in. macaroni strings. The maximum recommended working pressure is 1000 psi. The maximum recommended load is 65,000 lb with a 2-to-1 safety factor.
Hercules Tool Company, Inc.

Pump Built for Well Servicing

158 A new heavy-duty oil well servicing pump with a maximum rating of 6000 psi on intermittent service has been introduced. A triplex plunger pump called the PE-5, maximum ratings on intermittent service are stated as 130 brake horsepower, 290 rpm, 1336 gal per min and 6000 psi. It weighs 2990 lb.

Special emphasis was placed on designing for dependability under high-pressure service. This emphasis is said to have led the four PE-5 features in particular. These are a 1-piece cast steel fluid end, individually accessible valves, employment of an eccentric drive, and 1-piece connecting rods.

Although designed for oil well servicing, pump carries a continuous rating of 75 brake horsepower, making it suitable for water flooding, salt water disposal and other continuous operating services.
Gardner-Denver Company

Bridge to Drill Site

159 A new design for utility type bridges is easily and speedily erected by field crews or special crews from prefabricated units available on 48-hour order. On most installations complete assembly and erection can be done by small crews in 10 to 15 hours for welded joint assembly, and somewhat less for mechanical joint assembly.

Units are easy to handle, completely portable and due to the use of hermetically sealed box frame girder construction can be floated to the site of application. By use of modular units any span up to 200 ft can be crossed and the load design is 100,000 lb concentrated at center.

These bridges eliminate excessive costs of piling and piers in channels, have only half as much steel surface exposed to corrosion as other structures and have large flat surfaces which are easy to paint.

The Clear Span bridge can be reinforced to increase load carrying capacity greatly without taking the bridge out of service, and similar sections are interchangeable. Any part of the bridge can be safely used as a separate bridge for any span less than the total span of the whole bridge.

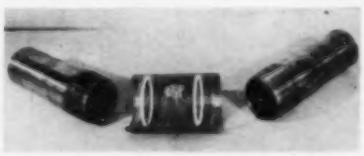
Vinculum Corporation

Pipe Joint Seals on Teflon

160 A seal for tubing or casing joints capable of withstanding higher pressures is now available through Atlas Pipe since its acquisition of subsidiary, Hardy-Griffin Engineering Corporation.

Hardy-Griffin manufactures the type "SS" integral tubing joint and "GT-API" coupling for tubing and casing connections. The "super-slim" pin and box tubing connection uses a single Teflon seal ring and is designed for high pressure single and multiple well completions. The "GT-API" coupling incorporates a simple modification of the API coupling by installing two Teflon seal rings.

Available in a wide range of oil-country tubing sizes, "SS" joint has a



60 deg American standard tool joint type of thread. This provides a quick-running, rugged, working thread. Teflon seal ring is the sealing member in the joint, and proven capable of holding pressures in excess of the rated bursting pressure of the tubing. The same principle is used to modify API tubing and casing couplings, and other types of threaded connections.

A retaining groove is machined into joint or coupling to assure that the Teflon seal ring cannot be dislodged in handling operations. Tests show that this machined groove does not cause any reduction in tensile strength. Strength of connections exceed that of the pipe body.

The Teflon ring seals off both internal and external pressures, because in making up the joint the seal ring becomes extruded over both sides of the retaining groove machined into the male member of the joint. This sealing of pressures from inside and outside is a factor of increasing importance in modern types of completions. Ring guarantees a complete seal without the use of expensive, roughage-filled thread compounds. Joints are easy to break out, even after long service periods, because only a lubricant is used in making up the joint.

Atlas Pipe Inc.

HGT "Super Slim" Specifications.

Tubing Specifications					Joint Specifications	
Tubing OD	Tubing ID	Ave. Wall	Nom. Wt/Ft	Drift Diam.	OD Turned	ID Bored
1.660"	1.380"	.140"	2.40#	1.286"	1.900"	1.301"
1.900"	1.610"	.145"	2.90#	1.516"	2.196"	1.531"
2.063"	1.750"	.156"	3.40#	1.656"	2.400"**	1.700"
2.375"	1.995"	.190"	4.70#	1.901"	2.750"	1.945"
2.875"	2.441"	.217"	6.50#	2.441"	3.290"	2.370"

**Optional turned OD of 2.325" and 2.330" available upon request.
Please inquire for data on sizes and weights of tubing not shown.

New Charge Packs Wallop

161 Two departures from conventional shaped charge design have resulted in a new perforating tool that packs more wallop than any charge of similar size. Known as the Dyna-Jet, the charge was introduced by Jet Research Center, Inc., a subsidiary of Welex Jet Services, Inc., and Byron Jackson Co.

Heavy test firing of the Dyna-Jet charge from a 4-in. perforating gun showed the charge cut 111 percent more hole area than the present standard 4-in. charge. Other plus factors noted were 205 percent more hole volume and 16.8 percent deeper penetration. This data was uncovered in side-by-side tests with and using the same type and amount of explosive as in the older standard charge of the same size.

A new ellipsoid shape incorporated in the design of the Dyna-Jet was a departure from the previous charge. Jet Research Center, Inc. junked the old cone-shaped liner. Another departure was the use of a steel barrier in the explosive charge. This barrier was added over the apex of the liner. When the charge is triggered, the barrier slows up shock waves traveling through it and initiates a low-order detonation in the main charge on the other side.

Meanwhile, unimpeded high-speed shock waves travel out around the barrier and overrun the expanding low-order front. In the low-order zone only part of the explosive has reacted. That not reacted, however, has been subjected to high temperature and pressure. These increase its detonation rate and pressure.

It is this overrunning action of the low-order by the high-order detonation in the spherical portion of the liner which contributes the big power increase.

Jet Research Center, Inc.

Today's Progress Provides A Glimpse Into Tomorrow . . .

Latest Production Methods Open up New Horizons

The Buck Rogers era in production may be down the road, but industry has come a long way and the future looks mighty promising. Here's a review of some significant developments and what they imply for the future

J. E. Kastrop
Editor

IN looking back over hundreds of significant developments in the production of oil and gas in the last year or so, one fact stands out above all others: Not only did the industry advance operating efficiencies that held production costs down, but it proved new ideas that promise to increase appreciably this nation's proven recoverable reserves. So long as individual incentive exists along with opportunity, progress will be made. While this nation's discovery rate may be on the decline, it is significant indeed that persistent and costly research is pointing the way to bringing out of the ground more and more of the oil found years ago. New devices and methods are increasing our production efficiency, bringing more oil from the reservoir to the surface. Improved facilities on the surface has helped reduce the cost of handling production and moving it in larger quantities to where it is needed, at less cost per bbl.

Accelerated expansion of production research facilities might be viewed as an index of oil's progress tomorrow. Every major oil company in this country owns and operates its own multi-million dollar production research program. Even smaller companies either contract or operate limited research. The objective: Better ways to produce more oil at less cost.

Biggest Strides Made In Oil Recovery

New Recovery Idea. Taking an overall industry view point, perhaps the most significant development in production during the past year has to do with a new idea in oil recovery. It is significant because if it succeeds half as well as all indications lead the experts to believe, it will vastly increase this country's recoverable reserves. And, when you think of our oil requirements 10 or 15 years from now, the idea takes on added importance.

As in the case with most new developments, this new recovery idea is the result of a technological evolution. It has several aspects, but deals with sweeping from the tiny pore spaces of the reservoir rock more of the oil originally in place. Some refer to this process as miscible-phase displacement; others call it condensing gas drives. Back in 1951, Atlantic initiated a high-pressure gas injection project in its Block 31 field in West Texas. The high pressures vaporized any left-behind oil to reduce residual oil saturation. In 1956, Humble was granted permission to inject a "rich" gas into the Bronte field of West Texas. Purpose of the rich gas was to increase the efficiency of the sweep. Just recently, Magnolia applied and was granted tentative approval by the Texas Railroad Commission to inject over 1½ million bbl of propane, followed by natural gas into the Parks Pennsylvanian field unit in Midland County, Texas. This latter method is called miscible-phase displacement, or miscible-slug displacement. Ultimate recoveries are estimated to be increased 100 to 150 percent (and perhaps greater) than primary recovery. A number of similar projects are under study now, and in the years to come, this method of oil recovery will be wide-spread, and limited only to the economical availability of liquefied petroleum gases used in the injection process.

Flame-flooding. Although insitu combustion was first tried in an underground reservoir back in 1951 by Magnolia in a very shallow non-commercial field in southern Oklahoma, results of this field experiment did point the way for its future application. A large-scale pilot flame flood got underway last year in California by Socony Mobil and its affiliates, Magnolia and General Petroleum Company. Idea is to provide added heat within the reservoir to decrease viscosity of heavy crudes so that more oil can be pushed into the well bore of producing wells. Oil in the formation is set afire electrically and supplied oxygen by pumping in air. If the scheme proves practical and economical, billions of barrels of this heavy oil may be recovered in this country and Canada by this method. Keep your eye on this California test.

Waterflooding. The oldest means of increasing oil recovery made some progress in techniques. Perhaps the newest idea in waterflooding is the success achieved in fracturing water input wells to increase injection rates. New chemicals have appeared to reduce surface tension between the water and reservoir rock, and thereby facilitate the flood process, but this phenomenon has been known for some time. It is interesting to note that oil production by waterflooding is continually climbing in all oil producing states, and will represent a predominant part of U. S. oil production by 1965.

Well Stimulation. Ever since formation fracturing proved highly successful to improve well productivity and formation drainage, well stimulation developments have gone in all direc-

tions. One of the outstanding new ideas developed and proved in 1956 was that of selective fracturing a number of zones without the use of packers, tubing, or drill pipe. Small flexible balls about one inch in diameter were injected into the fracturing fluid to stop up perforations taking the most fluid. Other perforations opposite the most impermeable sections were fractured, after which the flexible balls either dropped to the bottom of the hole or were recovered. It is now possible to multiple fracture a well in about the same time as it used to take to fracture one zone.

There have been significant improvements in fracturing fluids. Perhaps the biggest news is in surfactants added to the fracturing fluid to (1) break emulsions, (2) alter wetting characteristics of rock, i.e. from water-wet to oil-wet, or vice versa; and (3) to eliminate water blocking by reducing capillary pressure of the water in the pore spaces surrounding the bore hole.

A similar principle was employed to retard water coning in oil wells with strong water drives and where the producing interval was located relatively near the oil-water contact. Reverse-wetting agents are injected into the well to alter the wetting characteristics of the reservoir rock. These additives cause the rock to "prefer" oil rather than water, thereby allowing oil to flow through the pore channels while the water is "held off" below. Since water production is a heavy production cost item, look for more developments in reverse-wetting agents and their field application.

Well Logging. While refinements continue to be made on all forms of well logging, tools and techniques already proved, perhaps the highlight of new methods is that of velocity logging. Although an old idea for the geophysicist who requires velocity data for accurate interpretation of seismograph surveys, velocity logging for formation information took on added importance last year. Since velocity is a function of density, and density a function of porosity, the velocity log serves an important reservoir tool. Geophysical velocity logs were made by lowering a geophone in a well and setting off charges on the surface. Energy velocities were measured at various well depths. In recent improvements, the velocity logging device contains its own energy wave generator and receiver, spaced a given interval apart. Thus, the name interval velocity logging. It is still in the development stage and considerable more work and testing are required to make accurate porosity interpretations from velocity measurements. Several research labs are working on the idea and it will someday be a vital tool to the reservoir engineer.

The use of sound in well logging came into its own last year when a sonic tool was introduced to caliper salt caverns for LPG storage. These versatile instruments quickly and accurately determine the volume at various depths in a dissolved salt cavern.

The long-established mechanical hole caliper got a new look recently when an integrating mechanism was added. It is now possible to determine hole volume as well as hole size at various depths. One use is in calculating volume of cement required to cement casing strings.

Automatic Production Controls. Impetus in the mechanical phase of oil production has been toward development of practical and economical means of controlling oil and gas production from the wellhead into the pipeline by automatic methods. Automation, automatic lease programming, or whatever you care to call it, the idea emerged from the economic necessity of fewer field personnel taking care of larger and larger volumes of production. The remote areas of West Texas provided an excellent field testing and proving ground for automatic controls. And, when the industry started proving up the Gulf of Mexico leases at enormous expense, it was paramount that production costs be minimized. Automation holds great promise in this direction.

Industry has been exposed to a vast outlay of new gadgets to open and close valves, to blink a light at a remote point when something went wrong, and a host of other functions automatically and remotely. Some are electro-mechanical, some pneumatic-mechanical, while others are combinations. While it was not excessively difficult to perform all production operations automatically, the next step in the development chain was to perform all functions from relatively great distance. By use of leased telephone wires, radio and microwave transmission, and combinations of these, telemetering was introduced. Not only can the entire lease be supervised and controlled remotely by automatic means, but it is now possible to make a multitude of measurements which are indicated at some central point hundreds of miles from the field. Next step in production automation is to feed all this valuable production data to remote electronic business machines that perform all required bookkeeping and calculating functions without the tedious manual computations. While it may appear that the engineer is "engineering" himself out of a job, facts point to the opposite direction. Automatic lease programming is making it possible for field personnel to carry out their assignments better by providing more time to do those things that electronics, mechanics, and pneumatics cannot accomplish . . . as yet.

Well Completions. Permanent type well completions and PC workovers continue to improve, although no radical change has been indicated. A new development of recent date has been in unitizing service units for permanent completed wells for offshore use. For use on offshore production platforms, new unitized PC service units are now skid mounted . . . some on one large skid . . . others consist of individually skid mounted components. More dual and triple completions involved permanent completion techniques in one or more of the multiple producing intervals involved, to take advantage of PC workovers.

In the past few years, multiple completions have increased rapidly due primarily to economics and to vast improvements in equipment. Last year, the first triple completion involving three parallel tubing strings was installed successfully. Now, plans have been made to quadruple complete and it is not unlikely that such a completion will be made in the near future.

Successful development of under water drilling, primarily off the Coast of California, presages an entirely new concept of well completions. All wellhead equipment will be placed on the ocean bottom and controlled from central points ashore. Provisions have been made for full and safe control of flowing wells as well as for artificially lifted wells.

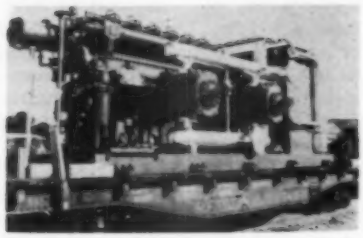
Hydraulic pumping units connected to sucker rods can be adapted, or present hydraulic methods may be readily employed for underwater artificial lifting. Very little modification in wellhead assembly would be required for the application of gas lift methods in wells completed on the ocean bottom.

And, more to come. For those who have watched technical developments in production for many years, new and better things are expected . . . for this has been the technical history of petroleum. Only the brief highlights of new developments can be presented in the brief space allotted here, and undoubtedly some important items have not been included. But even this very fast glance at new developments in the recent past is convincing evidence to the pessimist that there is no end point in sight. You and I may be set in a whirl by what's happening in atomic energy, the jet age, guided missiles and electronics . . . but, don't underestimate the impact they may have on oil production tomorrow. ★ ★ ★

THE NEW LOOK IN...

Production Equipment

An authoritative report by equipment manufacturers on their latest, most important new developments for oil and gas production



Turbocharging Hits Gas Fields

162 After five years of research and field tests, engineers at Worthington Corporation have produced a new turbocharged gas-engine compressor known as the SLHC. Available in the medium horsepower range (330-880 hp), the newly designed engine-compressor is the only gas-engine compressor in its class size that has been turbocharged.

First of these units is now in operation in a field gas gathering station in Oklahoma. This six cylinder unit is pumping gas from some 25 wells to one of Northern's main line stations at Hogoton, Kansas.

Turbocharging is a key feature of the SLHC. The turbocharger, deriving all of its energy from otherwise wasted exhaust gas, compresses ambient intake air to an elevated pressure for cylinder charging. This results in greater power per unit space and therefore greater portability as well as economy for any particular size. (All of these advantages apply to permanent installations, as well.)

The SLHC gas-engine compressor is designed for gas gathering, pipeline and distribution service; in natural gasoline plants; for pressure maintenance in oil fields; for oil refinery operations such as vapor recovery, re-cycling and stabilization of gases; for refrigeration systems, and in the petrochemical industry where various processes require the use of gas under pressure. (The SLHC can also be built to serve as either an air compressor for general plant air supply or as a basic refrigeration compressor.)

Five SLHC sizes are available in 4, 5, 6, 8, and 10 power cylinder combinations — in in-line design. Higher ratings will be offered where the turbocharging air can be after-cooled by water colder than can be provided by a radiator. This is possible in many permanent plant installations.

Worthington Corporation

A New Method of Piping

163 A new method of coupling and fitting light wall pipe is announced by Victaulic Company of America.

Basis of this new development is a means of roll-forming the Victaulic Groove in the ends of light wall pipe, thus preparing the pipe for fast, easy installation with Victaulic couplings and fittings.

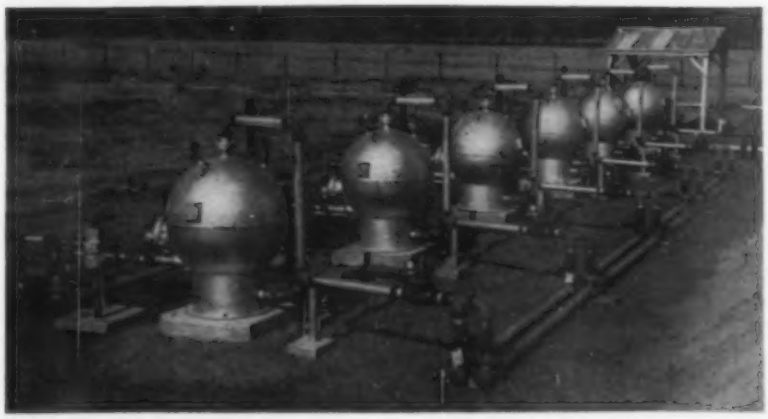
Now it is possible to select pipe according to weight and wall thickness to give the best flow characteristics at working pressures and prepare grooves in the field.

Of course, the light wall pipe saves money. Not only is initial cost lower than standard weight pipe, but faster installation saves substantial labor costs—cuts man hours in half in most cases. Important savings also are realized in transportation costs.

Typical oilfield applications include tank battery piping, flow lines, gathering lines, service lines to drilling rigs, etc. Also cement lined or plastic lined light weight pipe for corrosive services.

Leading pipe mills now supply a wide range of wall thicknesses and weights (steel and aluminum) with Vic-Easy rolled grooves, under license. For shop or field grooving, Vic-Easy portable tools, for manual or power operation, are readily available—size range, 1¼ through 8 in.

Victaulic Company of America



Want to Know More — Circle Number — Send Reader Service Card

Units Designed for Automatic Production

164 Increased demand for metering equipment for automatic lease operation and other purposes has been a significant factor for Sivalls Tanks, Inc. during the past year. Included are spherical and vertical metering separators, vertical metering treaters and continuous automatic samplers.

Heart of metering equipment is the controls system which has shown accuracy in excess of 99 percent in actual field operation. The controls are easy to calibrate, yet rugged and dependable. They have required a minimum of maintenance even when metering sour

Sivalls Tanks' spherical metering oil and gas separator is 78 in. in overall height. The controls are located in the box at left while a CEI continual automatic sampler is in operation at right.

production such as is found in the Fuhrman-Mascho and Goldsmith fields of West Texas.

Accuracy is obtained by use of a snapper type diaphragm-operated pilot to cause rapid action of the motor valves, and an action delay mechanism to prevent both inlet and outlet motor valves to the meter compartment from being open at the same time. This prevents flow-through of unmetered oil. Controls are adaptable to other separating equipment already in service in the field.

Also adaptable to a variety of uses is the Sivalls CEI continual automatic sampler, an intermitter type sampler designed for use with almost any dump type positive displacement meter. Sampler may be adjusted to take from 1 to 80 small spot samples per minute to give an operator a composite sample of fluid production through a metering vessel. It consists of a pneumatic intermitter, a sample strainer, a sample pump and a container. Inlet and outlet ports are sufficiently large to pass all foreign material not removed by the self-cleaning strainer.

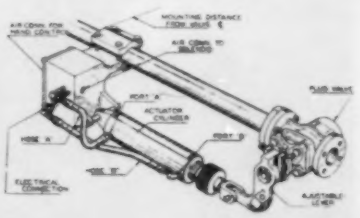
Controls are built integrally with either spherical or vertical separators and with vertical emulsion treaters. The spherical metering separator incorporates the metering controls and meter chamber in a vessel only 78 in. in overall height. Metering emulsion treaters are adaptions of Sivalls Type B and E vertical treaters available with diameters of 4, 6, 8 and 10 ft. One model recently went into service with special provisions for cold weather operation including insulated metal housings around the valves and with the water leg and other piping fabricated inside the treater shell. Design work is now nearing completion on the first in a series of wellhead type glycol dehydrators which incorporate the new Kimray glycol pump.

Sivalls Tanks, Inc.

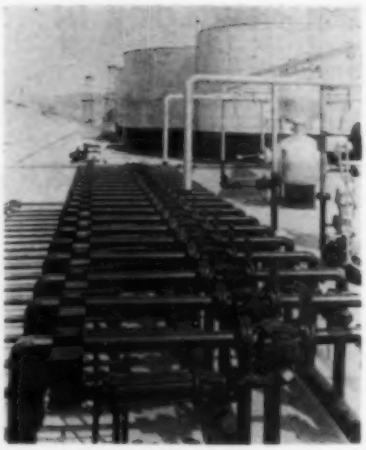
Plug Valve Actuation

165 Automatic control for liquid or gas transfer systems using plug valves may now be accomplished with the new Pantex Actuator. Designed to keep step with the trend toward complete automation, it is adaptable to existing installations as well as new projects. Featuring positive complete closing and full opening, this latest design meets the exacting requirements of the petroleum industry. Ruggedly built for dependable, long life service, Pantex actuators are packaged assemblies and are delivered ready to attach to pipe and plug valve stem in a matter of minutes without special tools.

Available for either manual or electric control, units may be installed on a wide variety of automatic or remote control applications. Using manual remote control, any number of plug valves can be controlled from a single control panel. When supplied with solenoid control, solenoid is installed within the pipe bracket, protected from the weather. Controls require a maximum of 20 watts for operation and may be tied into any type of automatic control system. Solenoid controlled ac-



Plug valve actuators on separator battery manifold in the Brea Canyon field, California, permits remote control of flow in system.



tuators are available for all standard a-c and d-c voltages.

All Pantex Actuators have the same basic dimensions, regardless of cylinder or pipe bracket size. Any cylinder can be used with any size bracket. Consequently, actuator models fit nearly every application, regardless of torque requirements or operating air pressure available.

Actuators are manufactured in valve sizes from 1 to 8-in. pipe, designed to fit all popular makes of plug valves and carried in stock at the factory and by distributors strategically located across the country. To meet the demand for larger heavy duty plug valve actuators, 10 and 12-in. pipe size units will presently be available.

Pantex Manufacturing Corporation

Nipple Permits Visual Check

166 For the past several months Southwestern Plastic Pipe Company has marketed on a limited basis a new product known as the Clear View Nipple. It created quite a bit of interest, and Southwestern is now manufacturing 3 types: (1) Male thread ends, (2) female thread ends, (3) combination ends.

Nipples permit visual inspection of low pressure flow lines and drain lines while in operation. On tank drains it serves as a quick check on flowing crudes or other liquids, thus reducing unnecessary losses of oil.

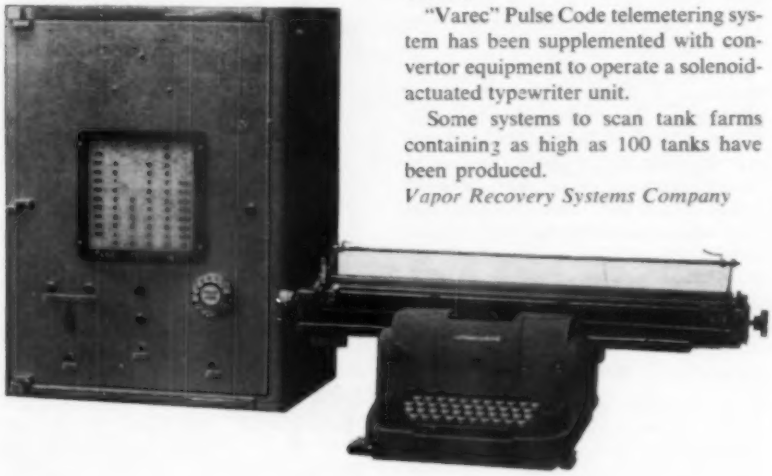
Use in Christmas-trees on low pressure pump units permits the operator to know almost instantly whether his pump is working.

The Clear View Nipple can safely withstand a working pressure of 92 lb, psi, at 73.4 F, and it has the advantage of being very easily assembled and installed into the lines. Dimensions are: Overall length, 12-in.; approximate visual area, 6 in.; diameter, 2 in., and thread, IPS Standard.

Southwestern Plastic Pipe Company

Scanner for Tank Farms

167 To maintain close control of flow of petroleum products in operation of tank farm, tank by tank, "Varec" Pulse Code has developed a scanner unit. This unit will provide automatic scanning for data logging on a pre-determined time schedule.



Liquid level, temperature, date and time can be reported on each tank. Either spot or average temperature of liquid contents of tanks can be recorded.

"Varec" Pulse Code telemetering system has been supplemented with convertor equipment to operate a solenoid-actuated typewriter unit.

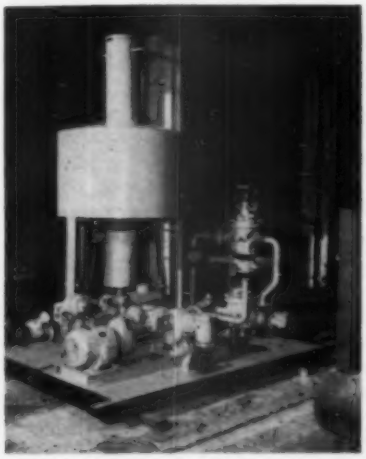
Some systems to scan tank farms containing as high as 100 tanks have been produced.

Vapor Recovery Systems Company

Runs Measured by Positive Meter Package

168 To keep pace with increasing acceptance of positive displacement meters for measurement of crude oil, Maintenance Engineering Corporation, is now in a position to furnish customers with completely integrated metering assemblies mounted on portable skids for easy transportation.

Incoming crude oil stream from the lease passes through a strainer which removes the larger solid impurities and then through a Deaerator which vents the non-condensible gases entrained in the liquid. Stream then passes through A. O. Smith Positive Displacement Liquid Meters mounted in parallel which meter the oil, correct its volume to 60-deg, print a ticket showing net barrels produced and includes a preset counter which shuts down the flow of oil when the monthly allowable has been run.



A pump is included to provide the pressure necessary to pump the oil into the pipeline and the assembly also includes a 3-way valve which automatically bypasses the oil back to the treater should it fall below pipeline quality.

In order to periodically prove the accuracy of the meters, an API Code Meter Prover is mounted on the skid and suitably manifolded to provide easy meter calibration.

In operation, the pumper merely sets into the meters the amount of oil to be pumped, cocks the starting switch for the pump motor, and at the end of the allowable run the unit shuts itself down without further attention. A run ticket showing net barrels is printed at the end of the run and is used as a basis for custody transfer.

The arrangement is extremely flexible and many variations to this basic system can be furnished to meet individual operating requirements. Additional accessories such as samplers and BS&W monitors can be included in the assembly and paced by the meters.

Maintenance Engineering Corporation

Reclaim Tank Bottoms With Chemical

169 Production, pipeline and refining companies can make money by reclaiming the bottoms from their large tanks. Within the past year the BrakeSol organization has proven that the paraffin accumulations in the bottom of large tanks can be economically treated back into the crude oil by the use of BrakeSol paraffin treating chemical. Money can be made by the company in that the worth of the oil reclaimed will be substantially more than the cost of the treatment, including chemical and labor. Operator also benefits by making more storage space available without actually taking the tank out of service.

Because of the ability to hold paraffin in suspension in oil, BrakeSol can dissolve the paraffin in the bottom of the tank and it will be absorbed into the oil and will not again fall out. Since crude will hold only so much paraffin, it is sometimes necessary to treat in two or more stages in order to eliminate large accumulations.

Basically the method of treating is to have about twice as much fresh oil in the tank as there is bottom, inject the BrakeSol through the hatch and then thoroughly roll the tank with air or gas or by circulating. Success of the treatment is dependent on thorough mixing in order that the chemical can be dispersed. In most cases no heat is necessary for such a treatment. When conditions require, an emulsion compound may be used along with the BrakeSol to aid in more complete water separation.

Each tank presents a different treating problem and the method of application will depend on equipment available, tank hook up, the consistency bottoms and the availability of fresh crude. BrakeSol treating engineers are available, at no charge, to survey each problem and to make recommendations as to the proper method of application and to assist with the actual treating.

As a preventive measure, tanks can be kept clean by continuous injection which will prevent paraffin accumulations in the pipelines as well as in the tanks.

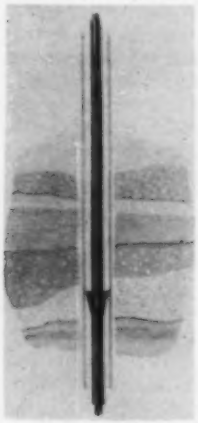
Another practical use developed is that of cleaning up the formation of old wells prior to fracturing or acidizing. Frequently the BrakeSol alone will bring up production by cleaning up the formation and perforations. Addition to the frac fluid will further insure against clogging the formation and aid in the clean up.

BrakeSol, Inc.

For More Info — Send Card in Back

Tubing Bailer Dumps Inhibitors

170 A new laboratory tested field method of applying liquid corrosion inhibitors has been perfected by Galloway Engineering Company.



The Barnes Liquid Dump Bailer, an 11-ft long stainless steel tube-like device, is lowered into the well by conventional wire line means. When the bailer has passed the joint of tubing where maximum corrosion exists, it is reversed which causes dump flanges to engage the rough tubing walls or at a collar. This unseats an "O" ring seal dumping concentrated liquid inhibitor in the area where it will perform the most good. Concentrated inhibitor then flows up the string treating every foot of tubing.

An important advantage in the dump bailer is that it permits the inhibitor to reach all internal surfaces of the tubing. This type treatment was never possible with solid stick or pumping methods. Also, shut-in periods during or after treatment are limited to about 1 hour on a run of 8000 to 9000 ft.

Galloway Engineering Company

New Oil Skimmer

171 Development of a new line of horizontal oil skimmers with daily water capacities ranging to more than 15,000 bbl was announced by Delta Tank Manufacturing Co.

Available in 7 models, the largest — a 30-ft long unit with a 10-ft diameter — has a 15,500 bbl per day capacity of effluent water with a 0.30 specific gravity variance. Smallest skimmer has a 1200 bbl per day capacity on fluids with a specific gravity difference of 0.22. Unit is 4 ft in diameter and 15 ft long.

Working pressure of the new skimmers is 40 psi for the 5 smallest models and 25 psi for the 2 largest units. Skimmer pressure is maintained by a gas equalizer connection which, in most cases, eliminates the need for pumps to move discharge water on to disposal points.

Standard equipment for the Delta skimmers include interface controller assemblies, lever-operated water discharge valves, 2-in. liquid head operated oil discharge valves, 2-in. relief valves, pressure gages with shut-off valves, 2-gage glass assemblies and inert packing material for the units' water distribution sections.

Delta Tank Manufacturing Company, Inc.

Three-Way Well Control Valve

172 McEvoy's new balanced valve allows working pressures which heretofore could not be handled with a 3-position motor diaphragm type valve.

New valve is applicable to automatic sequence well testing installations where the off position is used to shut-in each well's flow line; also used in conjunction with other equipment to periodically unload water from gas wells. May be used any place where fluid must be diverted between 2 outlets or shut-off.

Valve is motor diaphragm operated by gas pressure at 25 psi. Its position may be controlled either electrically or pneumatically. A heavy spring makes the valve "fail safe" to the off position; it is also built to fail open to a given outlet. Metal to metal seats give extremely tight closure to gas at high pressure. Streamlining of internal parts protects the plug-seat contact surface from erosion. The valve has a high flow capacity with a C_v Factor = 30 (30 Gpm or 1000 BFPD, with only one psi pressure drop). It will not falsely open against increasing inlet pressures of 6000 psi nor a back pressure differential of 3000 psi.

Maintenance is simple. All parts, including seats, are removable through bonnet. All packings may be replaced without disassembling top works. These features eliminate the need of expensive flanges as the body may be screwed or welded to the manifold.

Valve is being manufactured in the 2-in. size with WOG ratings of 500, 1500 and 3000 lb.

McEvoy Company

The Tulsa Oil Thief

173 Two new products have been introduced to aid in oil sampling and testing. New Walker Tulsa Oil Thief Model CB (clear barrel) contains all the operating features of the widely used all-metal oil thief. It can be tripped any where in the tank with the same rope that is used to lower and raise it. In addition it has the clear plastic barrel for those who desire this feature.

New Walker Heated Centrifuge Model 100 ml is a combination preheater and heated centrifuge machine for the accurate and economical testing of crude oil in 100 ml ASTM pear shaped test tubes. It uses hot water from the gager's vehicle to heat the preheaters and the main body of the centrifuge. Gager can heat the samples in the preheaters and then place them in the machine where they will remain hot during the grind out period, thus insuring an accurate test for BS&W regardless of weather conditions.

W. L. Walker Co.

Inserted Venturi

174 Venturi tubes with stainless steel metering sections are now being produced by Vector Manufacturing Company. Designs were created especially to make use of low cost production methods with stainless steel.

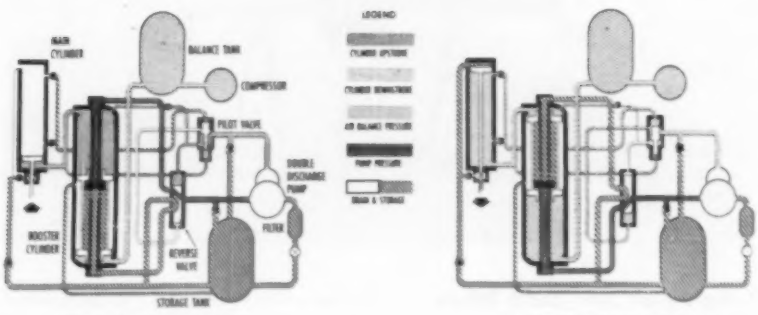
These primary elements for liquid and gas flow metering create low unrecovered pressure loss and require short upstream straight run of pipe. Their cost is generally lower than conventional cast iron designs even though stainless steel is used extensively.

Two general styles are offered: A complete venturi and an insert style in which the metering section fits into the existing pipe.

With all critical metering portions made of stainless steel, the original high accuracies will be maintained for an exceptionally long time. Stainless steel also makes them suitable for many applications for which other types are not usable such as for the measurement of acids, alkalies, other corrosive chemicals and industrial wastes.

Designs are flexible, not being limited by foundry patterns, so can be tailored to fit any location.

Vector Manufacturing Company, Inc.



UPSTROKE AT LOWER REVERSAL

DOWNSTROKE AT UPPER REVERSAL

New 10-Ft Counterbalanced Pumper Developed

175 Production capacities of several hundred barrels per day from a depth of 8500 ft are now possible with a new counterbalanced hydraulic pumping unit developed by Axelson. This unit, called a Hydrax 10′ CB, has been designed to handle an upstroke load of 18,000 lb, cycling 8 times per minute on a full 10-ft stroke.

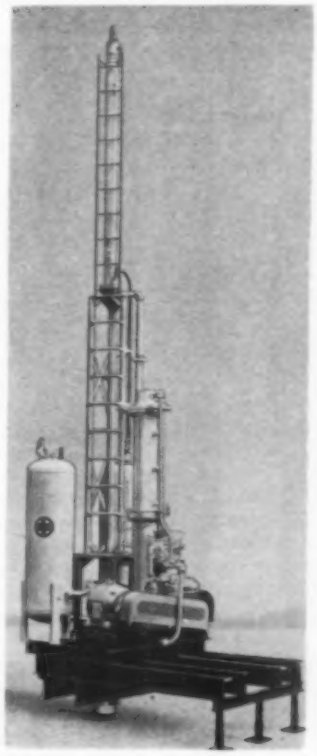
No foundation is required, as it has been designed to bolt directly to the casing spool. Automatic valves for time-clock control are standard on all units. The unit is complete, ready for installation, less power oil, drive components and prime mover.

Hydraulic dampening and constant polished rod velocities result in longer trouble-free sucker rod and subsurface pump life.

The schematic adjoining diagram may be simplified by analysis of each of the three independent circuits: Two hydraulic and one pneumatic. These circuits are necessary in order to eliminate oil-air interface and to reduce discharge volume at the power pump.

The power pump circuit is isolated from the well cylinder and reciprocates a floating piston within the booster cylinder. The booster cylinder piston is displaced approximately 35 in. which in turn displaces sufficient volume to move the well piston through 10 ft of stroke. The counter-balance effect is maintained through use of air operating on a 10¼-in. piston within the booster. On the upstroke, the air and the power pump operate against the well load. On the downstroke, the well load and power pump operate against the air counterbalance.

A secondary pump supplies make-up fluid to the well cylinder during the upstroke portion of the cycle. Any excess fluid is automatically discharged back to the storage tank during down portion of the cycle.



Unit may be easily skidded on its sub-structure for well service operations.

Author: R. W. Reekstin, Chief Engineer, Petroleum Equipment Department, Axelson Manufacturing Company

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Automatic Control of Pumping Unit

176 An oil well pumping controller with unique Supertimer now provides full automatic control for across-the-line squirrel cage motors. Along with the many standard features the Supertimer represents the latest in automatic control and safety.

This combines 2 important functions in a single unit—programming and time delay starting. Programming provides accurately controlled, day or night automatic operation of the pumping unit. Automatic starting and stopping is set in any combination of 15 minute increments over a 24-hour day, 7 days a week.

Time delay starting feature permits instant starts or delays up to 3 minutes in 2½-second increments. No danger to power transformers or lines from overloading, as timer staggers restarting of a group of pump motors after service interruption or power failures —all automatically!

To set up a pumping schedule, grasp dial of the time clock and rotate till the pointer shows the time of day. Pull out the desired number of tabs on the periphery of the dial, each of which represents a specific 15 minutes of pumping time and your schedule is in operation.

The time delay on starting is set by depressing the time delay pointer on the timing dial, located within the regular programming dial, and rotating to the desired time delay setting—from 0 to 3 minutes. In increments of 2½ seconds, the dial provides 73 accurately controlled restarting intervals to bring pumps back onto the line in sequence and with the time spacing desired.

Day omission feature is a small dial with 7 set screws each representing a day of the week. To omit the pumping schedule for any day or days a few turns of the selected screw or screws with a screwdriver is all that is necessary.

Enclosure is a weather resistant NEMA Type 3, designed to provide proper protection against weather hazards, such as rain or sleet. Aluminized case reflects the sun's blistering heat, and the chimney draft ventilation removes internal heat. All openings in the cases are screened to keep out bugs, pollen and wind-borne litter and dirt. A threaded conduit hub is located at the top of the case and knockouts in the bottom of the case.

Cutler-Hammer, Inc.

New Approach to Tubing Anchors

177 Two new tubing anchors, one tripped mechanically by rotation of the tubing and one that is tripped hydraulically, have been announced by Baker Oil Tools, Inc.

Designated Compensating Tubing Anchors, devices are fully automatic in that they permit the tubing to move freely downward but prevent upward movement. In pumping the anchor permits the tubing to elongate as it is filled, and temperature increases. This allows the tubing to seek its most elongated position.

The phenomenon of tubing breathing as the fluid load is alternately transferred from the sucker rods to the tubing in pumping wells has long been recognized as a major cause of lost pumping efficiency and increased wear on sucker rods, tubing and casing.

Anchors developed by Baker differ from other tension-type anchors in that the tension is not applied from the surface but rather results from the natural elongation of the tubing and the fact that the anchor prevents it from contracting. In addition, they automatically compensate for later elongation due to changes in well conditions such as lowering of the fluid level and changes in fluid density as water-cutting increases. Thus the correct amount of tension to prevent both tubing breathing and buckling is automatically maintained at all times throughout the life of the well.

Design of the anchors is simple and yet unique in that the slips do not move onto the cone, but rather the cone is forced up under the slips, either by hydraulic pressure or rotation of the tubing, depending upon the model used. This, plus the inclusion of a coil spring that keeps the slips from retreating from the cone, provides for virtually immediate engagement of the slips, thus minimizing the possibility of their causing undue wear on the casing. Both models of the anchor have been provided with a quick, positive release.

Baker Oil Tools, Inc.

Pumping of Two-Zone Wells

178 Completion of 2-zone wells has become common practice. Now there are many of these wells equipped with 2 strings of 2-in. tubing installed in a single string of 7-in casing. While the 2 strings of tubing work satisfactorily, a pumping problem is created, as the polished rods are only 4 in. apart, on centers. For each well to be pumped by its own unit, a system had to be devised to prevent interference between the wireline hangers of the 2 units. Operators tried installing one unit at ground level, the other on a high concrete block so that the carrier bar on one unit did not travel as low as the highest point reached by the carrier bar on the other unit. This method worked, but installation cost was excessive.

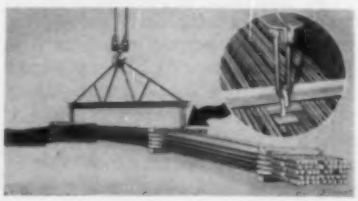
A system has been devised whereby the 2 Lufkin pumping units could both be set at ground level, yet carrier bars would pass each other, even though the center distance between the strings of 2-in. tubing was less than 4 in. Lufkin Foundry and Machine Company is manufacturing a special wireline hangar for this service.

To date experience with this type of installation has shown it to be entirely satisfactory. Expense for foundation is minimized, each unit can be operated independently of the other, and each unit can be operated at the stroke length and pumping speed required. This combination of economy of installation and flexibility of operation has proved to be the best yet devised for pumping 2-zone wells.

Lufkin Foundry and Machine Co.

Bundled Sucker Rods

179 Jones and Laughlin Supply Division has added bundled sucker rods to its line of production equipment. The rods are factory crated by Axelson with lifting hooks installed. (See inset.) A sucker rod unloading sling is used at most of J&L's 89 stores for unloading carload shipments, and to store and load out the bundled rods. A 40,000-lb rail car can be unloaded in about 2 hours, using a gin-pole truck and unloading sling.



This method of handling not only speeds up service to the customer, but guards against damage to rods during storage and subsequent handling. Rods are bundled to weigh about 5000 lb, with the number of 25-ft rods to the bundle determined by the size:

100	⅝ in. Rods to the Bundle
100	¾-in. Rods to the Bundle
80	⅞-in. Rods to the Bundle
60	1-in. Rods to the Bundle

J&L Supply strives constantly to improve its service to the oil industry. Bundled sucker rods with the companion unloading sling is a current example of continuing progress.

Jones & Laughlin Supply Division, Jones & Laughlin Steel Corporation

Valve Adapted to Wire Line Mandrel

180 Merla Tool Corporation has developed the Type WF-8R intermitting gas lift valve, an adaptation of their Type WF-3 valve for installation in wire line retrievable side pocket valve mandrels. Design and operation of the pilot section is practically the same. Power section differs slightly in that flow of gas through this section is directed downward instead of upward. Main inlet valve passage area is equal to a port ½ in. in diameter. All pilot valve seats are nylon and all pilot valves are tungsten carbide.
Merla Tool Corporation

Higher Horsepower for Downhole Pumping

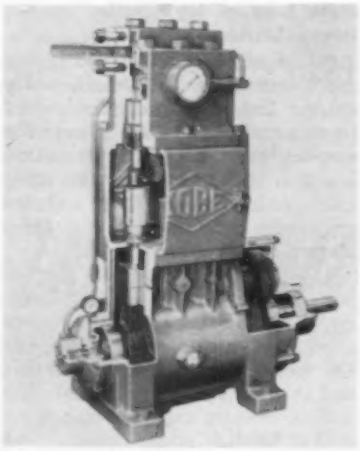
181 Higher hydraulic horsepower rating plus improvements in operating and servicing features characterize new 60 hp high pressure Kobe triplex pump recently introduced. Designed for handling crude oil, primarily as the power supply for the Kobe hydraulic pumping system, the unit has a maximum pressure rating of 5000 psi and a maximum displacement of 2000 bbl per day.

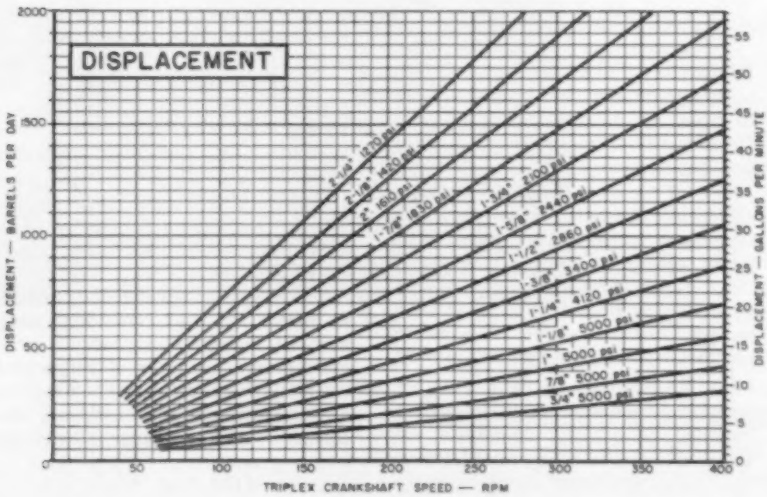
It is available separately or as a power unit, mounted on a skid base with a prime mover and with a charging pump and chemical injection system.

New pump is a modification of unit manufactured for 25 years and like the older version, is designed for continuous, 24 hr per day service. Increased power rating is a result of an improved lubrication system plus a new plunger-crosshead stem connection design which permits higher operating speeds.

Principal features of the new design are the following: (1) Maintenance-free telescoping sleeve seals on the crosshead stems, (2) enlarged and more readily accessible spacer block with lightweight, easily removable hand-hole covers, and (3) simplification and streamlining of the charging and chemical injection systems.

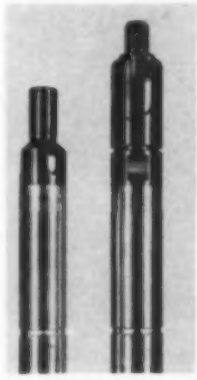
The design also has led the way to the inauguration of a crankcase exchange program which permits rapid repairs in the field.
Kobe, Inc.





Innovation Lubricates Pump Plunger

182 The Oilmaster Oil Lubricated Plunger is a new development in rod drawn pumps. It is specifically designed for use in high water cut wells where the poor lubricating quality of water is an important factor contributing to pump wear. The Oil Lubricated Plunger overcomes this problem by separating clean oil out of the produced fluid in an annular flotation chamber and on each upstroke it supplies a film of this oil to lubricate the closely fit seal between the barrel and plunger. This oil lubrication reduces both friction and rate of wear. In addition, since crude oil normally has a viscosity higher than that of water, it wil improve pump efficiency by reducing the slippage of fluid past the plunger.



The device may be run either in a tubing pump or in a stationary barrel insert pump. In external appearance, it is identical to a box end plunger except that there are a number of holes drilled through the top groove into the inside of the plunger body. A conductor tube extends from the top bushing to a point near the bottom of the plunger permitting a free passage for produced fluid through the tube, but leaving a liberal annular area between the outside of the tube and the plunger. It is in this annular area that the oil is trapped while the sand and water settle and are removed from the plunger when they rejoin the main fluid stream. From the top of this chamber, the oil is fed through the holes into the lubricating groove. Since there is no top valve, the pressure above the plunger is the same as the pressure in the lubricating groove. Therefore, the slippage of fluid all takes place from the lubricating groove to the bottom of the plunger, and the fluid slipping by is the clean oil that has been separated in the floatation chamber.

An additional feature of the plunger is the fact that the flotation chamber can initially be filled with grease which will supply lubrication for some initial period. Since pumps are frequently required to produce pure water for a number of hours before any oil enters the suction, this initial high pressure greasing system can be a big aid to the pump during the critical break in period.
Fluid Packed Pump Company

Pump Power Units

183

New power units built by J. I. Case Co. for oilfield pumps and other stationary installations include 3 sizes of air and water cooled engines, capable of producing up to 78 maximum continuous hp, or 92 maximum intermittent hp. All three sizes offer a choice of spark ignition for operation with LP or natural gas, or diesel combustion.
J. I. Case Company

Flexible Filter Reduces Pump Maintenance

184 Sand damage to oil pumping equipment, which has traditionally been a costly problem for oil well operators, can be reduced significantly by the development of a unique new flexible-type sand filter.

Filtering element of the new Mark Sand-Free filter is made of special synthetic foam rubber which is flexible and rejects sand, but allows the fluid to pass through its pores. Sand, though abrasive against hard, inflexible materials, will not cut rubber.

Conventional sand screens are ordinarily perforated or slotted metal strainers. These rigid devices become caked up with sand which blocks the strainer openings, gradually reducing oil production or cutting off the flow of oil completely.

New filter is constructed of 2-in. perforated seamless API tubing which is encased in a special synthetic foam rubber filter. A coiled steel spring fits over the rubber to protect it, permitting the rubber to flex freely. The filter is made in the 2-in. size only, and is designed oversize to more than handle the capacity of the tubing and the pumps. Clayton Mark is considering other sizes on the filter to add to its line in the future.

Installed below the pump, filter has an outside diameter of 4¼ in.; is designed to be used in the 5½-in. OD or larger casing.
Clayton Mark & Company

Harold J. Alwart, chief engineer for Clayton Mark & Company, points out the special synthetic foam rubber filter element which is flexible and rejects sand, but allows the fluid to pass through its pores.

Slim Hole Pump for Duals

186 Designed for dual completions using parallel tubing strings and 2 pumping units, D+B Slim Hole Challenger pump is the latest addition to sub-surface pump line.

Pump is installed in 1¾-in. nominal ID flush joint tubing with 5½-in. casing. Unit is a rod full barrel type that can be equipped with either a top or bottom hold down. The pump has a 1¼-in. diameter bore and is furnished in various lengths to fit the surface unit stroke. D+B standard materials for the pump are a hardened and honed tube, hard cast iron plunger, armored fittings and stainless steel valves.

Varying well conditions can be met by customizing of pump with parts available through Continental-Emsco stores and pump shops. All normal replacement parts are of API construction.
D+B Division of Continental-Emsco Company

New Line of Hydraulic Pump Units

185 Engineered Oil Tools, Inc. introduces the Johnston Hydraulic Pumping Unit, which comprises a complete new line of units, economical for pumping applications from less than 1000 to 9000 ft. This equipment combines simplicity and low price with a number of new design features.

Unit consists of a cylinder unit and power unit. The cylinder unit screws on the pumping tee and uses a conventional bottom-hole pump. The power unit contains hydraulic pump, oil tank, and cooler, mounted on a steel plate.

Four cylinder unit sizes include 3-ft stroke, 4000 lb polish rod load; 6-ft stroke, 6000 lb polish rod load; 9-ft stroke, 8600 lb polish rod load, and 12-ft stroke, 15,000 lb polish rod load.

Power unit sizes include horsepower ratings from 3 to 84 hp.

Equipment may be combined so as to make 12 different workable units for all conditions of depth and production requirements.

One of the most interesting new design features is that the valving arrangement permits the operator to pump bottom at will, by turning a valve handle. This same valve affords an extremely smooth reversal at both top and bottom of stroke. All units are completely enclosed, so that no moving parts are exposed to dust from the atmosphere. Hydraulic oil coolers are included as standard equipment enabling all units to be operated at their maximum published ratings without the addition of auxiliary cooling equipment. Cylinder units are shipped with the polish rod and packing installed, so all that is necessary in an installation is to space the well, pick up the cylinder unit and screw it on the pumping tee.

The low cost and simplicity is due largely to the simplified, reversing valve, which eliminates the need of a pilot valve and does not depend upon close machining tolerances for proper valve operation.

The unit was conceived and designed by Blaine Johnston, consulting engineer, of Dallas, Texas, who is presently general manager of Engineered Oil Tools. Johnston has spent a number of years specializing in hydraulic machinery, and particularly hydraulic pumping units.
Engineered Oil Tools, Inc.

Rod Pumping Shallow Wells

187 Since the first pumping unit built for the early Pennsylvania oil fields, Alten has been a leader in pumping unit design. Here is another Alten development.

New Alten Pumping Unit, the A-3F-D6 "Mustang," was designed especially for low-cost, long-term operation of waterflood projects and shallow well production. The completely new gear reducer was engineered especially for the D-6 unit. Lower tooth pressures and longer life are provided by extra wide gear faces. Low level oiling system is made possible by Alten's unique oil wipers. Double-ribbed reducer housing gives distortion free strength. Frame and samson post assembly are most rugged frame on any small unit. Many other time tested principles are found on this small unit which are normally only designed on larger units.

The "Mustang" has a 3000 lb polished rod capacity, 6400 in.-lb torque rating, and a choice of five stroke lengths from 13 to 18 in. Throughout, unit is the result of Alten's experience and advanced engineering techniques.
Alten Foundry & Machine Works, Inc.

Thermostatically Controlled Air Intake

188 To provide efficient and economical operation in the new White Tractor in both the 9000T and 4000T Series, The White Motor Company has introduced a new type air intake that operates automatically under all weather conditions.

When outside air temperature is below 70 F, the thermostat in the air induction system control chamber is in closed position to outside air, thereby drawing warm air from under the hood. This provides a quicker warm-up for efficient operation of the White Mustang engine. The air induction controlled air temperature chamber is an integral part of the air cleaner. This design eliminates unnecessary hoses and possibility of air leakage.

When the underhood air temperature is over 80 F, the thermostat will open the valve, allowing cool outside air to enter the air induction system.

For underhood air temperature of between 70 and 80 F, the thermostat will modulate, in proper proportion, warm air from under the hood and cold air from outside.
The White Motor Company

Pumping Unit Line

189 Jensen Bros. Mfg. Co., Inc. is introducing a new line of full rotary counterbalanced pumping units to completely round out their pumper products. This new unit has fully adjustable crank weights, using the rugged and simple system of pinion gear and rack, to move the weights to any desired position.

These machines are completely floor clearing in design and are built in 6 sizes, ranging from 36,000 through 150,000 peak torque reducers.

Rotary balanced units are incorporated with low gear tooth pressure reducer design. They are designed for pumping wells requiring pumping speeds of upwards of 50 ft per min plunger travel, and where higher starting loads are of no particular importance.
Jensen Bros. Manufacturing Company, Inc.

What the WELL-DRESSED, MEDIUM-PRESSURE Wells are wearing

This well is equipped with the compact "Tee Base Type" HERCULES Duplex Stuffing Box and HERCULES "Type SO" Tubing Head. The Tubing Head is equipped with HERCULES original overhead packing arrangement and self-aligning hinged slips, making this a simple yet complete hook-up, featuring safety with simplicity and minimum of parts.

AVAILABLE THROUGH ALL SUPPLY STORES

If you have any problems involving well head equipment, a phone call, telegram or letter will bring you the desired information — quick.

HERCULES TOOL Company

"MANUFACTURERS OF OIL FIELD EQUIPMENT" SINCE 1924

GENERAL OFFICES AND PLANT TULSA, OKLAHOMA

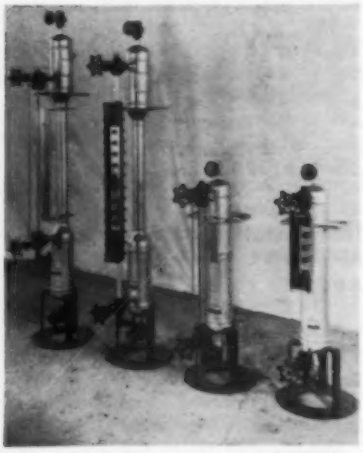
Export Representative: Oil Field Equipment Co., Inc., 30 Church Street, New York 7, N. Y.

New Shrinkage Tester and Meters

190 Oil Metering and Processing Equipment Corporation has developed 3 new vessels for use in metering well fluid components. The vessels are an FV Vol-U-Meter with cone bottom, a Type F Metering Separator, and a Shrinkage Tester to determine shrinkage of crude oil or distillate due to pressure reduction.

The Vol-U-Meter with cone bottom differs from the standard FV Vol-U-Meter only in shape. Vessel is plastic lined to prevent foreign matter from collecting in the vessel and reducing the accuracy of the unit. It has one LLC pilot at the upper dump level and another at the lower dump level located in the reduced necks of the vessel.

Type F Metering Separator separates and accurately meters well fluid components. Individual LLC pilots are located at both the upper and lower dump levels. Well fluid enters the separating (upper) compartment of the vessel and passes through a degassing element. Gas passes through a mist extractor and is discharged from the top of the vessel. Liquid settles in the accumulation compartment from which it flows into the lower metering compartment.

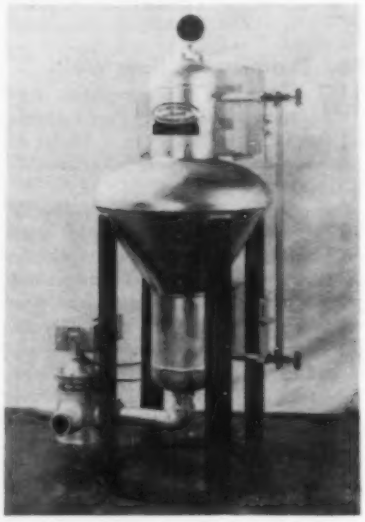


Each complete metering cycle is registered on a counter or recorder.

Both the new Vol-U-Meter and the Metering Separator are available in working pressures from 125 to 2400 psi. Dump volumes range from ¼ to 10 bbl. They are recommended for use where volume accuracy is important, such as royalty and tax payments and co-mingling produced oil.

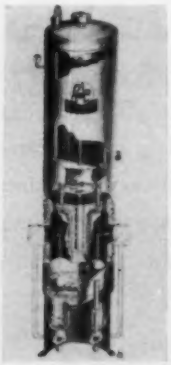
New Shrinkage Tester was designed for use with either the above units or Well Tester, as well as with comparable units. The Shrinkage Tester is connected to the gas section of the separator, and to the lower liquid connection of the separator. Liquid fills the Shrinkage Tester, and as the gas pressure is released, the shrinkage is observed through a gage glass.

Oil Metering and Processing Equipment Corp.



Separator-Meters in One Vessel

191 Rolo Manufacturing Company has introduced a combination separator and dump-type liquid meter, all in one vessel. These units offer greater economy and efficiency when used as either test separators or continuous production separators. As test separators, the automatic metering feature enables oil to be flowed into the bulk line after metering, thus eliminating need for a test tank and test tank gage. As individual well separators, continuously separating and metering the well's production, they permit common gathering lines for groups of wells, allowing savings in flow lines; also, the continuous well production data afforded is invaluable for production records.



Rolocheck Metering Separators are offered in two types: Two-phase and three-phase. Two-phase units separate gas and oil, metering total liquid with one Rolocheck Meter. Three-phase units separate gas, oil and free water, and meter oil and free water individually by means of one Rolocheck Meter for oil and one for free water.

In the two-phase unit, oil and gas are separated in the separator (upper) section, gas exiting through a monel mesh mist extractor at the top. Oil flows by gravity through the Rolo Neutral Position 3-Way Valve into the Rolocheck Meter. The meter float, guided in its vertical travel by a float guide rod, maintains the meter liquid levels between the upper and lower reduced-area necks, operating the pilot to control the 3-way valve so that the meter alternately fills with and then discharges exactly calibrated volumes of liquid. Each cycle is counted on a totalizing counter.

In the three-phase unit, oil, gas and free water are separated in the upper chamber. Free water settling out of the oil flows upward through a downpipe, entering a water compartment, from which it flows by gravity into the water meter. Oil and emulsified water flow by gravity to the oil meter. The oil and the water meters operate independently.

Metering separators are available in all sizes and working pressures to handle up to 4400 bbl per day.

Rolo Manufacturing Company

Instrument Senses Fluid Interface

192 Electrical capacitance is sensing technique of a new fluid interface measurement instrument designed for automatic tank battery and pipeline operations. Called Enniscope Interface Sensing Instruments, the basic indicating probe is packaged with other instruments to form 3 control systems. These are the Automatic Tank Bleeder, Automatic Fluid Level Control and Automatic Interface Indicator systems which are applied to sumps, wash tanks, scrubbers, settling tanks, pipelines, etc. Heart of the system is a small interface indi-

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cator which is mounted in the vessel or tank at the point to be indicated. Probe extends into the vessel at the desired point and level is measured by the change in frequency and capacitance of the electrode. An electronic unit used in system delivers a radio frequency oscillation that generates a radio field around the electrodes. Any change in the dielectric properties of the fluid produces an indication on the electronic unit. Different dielectric constances of water, oil, emulsions and air permit this instrument to register accurately fluid interfaces as well as fluid levels.

There are no moving parts that need lubrication. Electrode is not unduly affected by a coating of wax and only in extreme cases is it ever necessary to remove and clean it. Only one electronic tube is used in these systems.

Oil Well Water Locating Company

Valve Designed for Dump Service

193 Oil and gas production industry has many applications which require a specifically designed control valve. The series 125P high pressure diaphragm control valve was designed to meet these requirements for dump valves on high pressure vessels such as oil and gas separators, scrubbers and dehydrators, and for various wellhead applications. They are operated by pilot devices such as intermitters, pressure controllers and level controllers.

Electric cast steel valve body is available in globe or angle design with 1 and 2-in. screwed end connections, and a pressure rating of 2000 lb WOG. Body to stuffing box connection is accomplished with a forged steel hammer lug nut which provides correct alignment, adequate strength and greatly simplified assembly and disassembly of the valve.

Standard valve trim is stainless steel. However, where severe erosion is a problem Carboloy trim is available as a carbide tip and a full bore cage carbide insert. Two topwork sizes are available for economy or more severe service conditions. Both are designed for operation over a 4 to 12 psi range. Maximum topwork travel is ¾ in.

Diaphragm casings are cast iron with formed steel diaphragm heads. This topwork was designed to mount on the body with a one-piece stem construction, which provides sound performance characteristics in an extremely compact unit.

Fisher Governor Company

If you're looking for depth . . .

. . . try GAS LIFT!

Range of operating depths on gas lift operation is unlimited. The same valves used at maximum operating depths are used in producing the shallower producing horizons. Stresses and strains on equipment do not increase in proportion to depth, therefore, economics favor gas lift operation as depth of operation increases.

Merla Tool Corp. FLeetwood 2-1754, P. O. Box 2576, Dallas, Texas — Clif Mock Co., Houston, Phone OLive 4-2641 — Clif Mock Co., Beaumont, Phone TErminal 8-2814 — Clif Mock Co., Lake Charles, Phone HEmlock 6-8264 — Clif Mock Co., New Iberia, Phone EMerson 9-3626 — Clif Mock Co., Lafayette Phone CEnter 4-1824 — Odex Engineering Co., Odessa, Phone FEderal 7-3568 — Engineering Service Co., Corpus Christi, Phone TUlip 3-4489 — Merla Tool Corp., Oklahoma City, MElrose 2-6983 — Merla Tool Corp., Shreveport, Phone 6-2447 — Production Equipment Products Co., Wichita Falls, Phone 2-5717 — Swan Specialties Co., Casper, Phone 3-4585 — A. Greer Co., Farmington, Phone DAvis 5-3123 — Eastman Oil Well Survey Co., 4002 Macleod Trail, Calgar, Alberta, Canada, Phone 3-3446 — Petroleum Industry Consultants, C. A. Caracas, Venezuela, S. A., Phone 55-70-92.

Unit Tests Relays

194 For many years the proper setting and testing of relay devices has been a headache to the maintenance electrician in the field. A complete, compact and practical test set that makes protective relay testing under actual operating conditions simple and easy has been developed by Nelson's Customer Field Service Department.

Unit is designed for testing the operational functions and timing of single phase, a-c protective relays of either the instantaneous or time delay types.

The voltage element has 3 ranges, 0 to 50, 0 to 150, 0 to 300 VAC with close adjustment by means of powerstat control. Current element has scales of 0 to 5, 0 to 25, 0 to 100 amp a-c. Voltage and current elements can be used either separately or combined, and either with or without the timer.

Isolation transformers are used on all circuits, preventing shock from test leads to ground. The unit comes complete with all necessary input and test leads.

Operation is simplified by the use of red mimic bus on the black panel. The arrangement of components along the bus is clearly shown so each operation follows in logical sequence.

The use of the Nelson relay tester in regular maintenance procedure will make possible the most efficient operation, reduce down time and lost production.

Nelson Electric Manufacturing Company

SECONDARY RECOVERY

Water Treater for Flooding

195 Preventing precipitates and suspended matter from plugging oil producing sandstone formations is being solved by the use of Cochrane Reactors which soften and clarify the water in a single unit.

The unit shown, installed for a large flooding company in the Southwest, provides a capacity of 2,920,000 lb per hr. Because of the reactor's special catalytic design, newly-formed precipitates plate out and grow rapidly providing more complete reaction and the production of clear water in a shorter time.

The shortened retention time provides savings in the size of the tanks employed, and water waste is kept to a minimum. Chemical savings are impressive and de-sludging is completely automatic.

For cold water softening and clarification Cochrane Reactors are equally efficient in the clarification of surface waters and for cold lime softening of well or surface waters.

Cochrane Corporation

Inhibitor for Cooling Tower

196 By carefully combining several effective corrosion inhibitors, National Aluminate Corporation has developed a new water treatment formula for control of corrosion in cooling tower systems.

Nalco 360 is basically a chromate type material to which other inhibitors, each of which exerts a synergistic effect on the others, have been added. The resulting combination is said to provide much better corrosion control than any of the several inhibitors used alone. The new product is effective over a relatively wide range of pH conditions, thus control of pH of the cooling water is easier and much less exacting than is required with many corrosion control treatments.

It is produced in the form of 3-in. diameter ball briquettes, weighing approximately 1-lb each. To apply the chemical a simple by-pass feeder is normally used. Cooling water passing through the feeder dissolves the ball briquettes and carries the solution of chemical treatment back into the cooling water line. In other cases the chemical briquettes are merely dissolved in a wire basket suspended in the cooling tower basin.

National Aluminate Corporation

New Water Flood Stimulator

197 A new product know as Fludex is announced by the Tretolite Company. Fludex is, in the words of a Tretolite spokesman, a "multipurpose chemical formulation ideally suited for operations where combinations of scale, corrosion and bacteria are contributing to the malfunction of flood or disposal systems."

It is particularly useful where the incompatability of certain treating agents may add further complication when 2 or more of the above-mentioned forms of attack are involved.

Its functions in these areas are 4-fold: (1) *Excellent wetting agent.* By reducing the interfacial tension, and conditioning the surface of the formation, Fludex makes it possible for the formation to receive more water, in less time, and at lower injection pressures. (2) *kills sulfate-reducing bacteria.* Sulfate-reducers cause considerable damage in injection systems, since they reduce sulfates to hydrogen sulfide, in turn producing insoluble iron sulfide which plugs the formation. Fludex is effective in preventing or destroying both anaerobic and aerobic organisms. (3) *inhibits corrosion.* As a result of its bactericidal action, Fludex is able to reduce the corrosive effects that would otherwise occur in the presence of greater quantities of hydrogen sulfide. (4) *aids to defloculation of solids.* Strata solids and similar matter are suspended to prevent deposition. Precipitates and similar suspended matter are filmed as soon as they are formed — to eliminate the growth and eventual agglomeration of these objectionable deposits.

Tretolite Company

Pocket Meter Aid to Petroleum

198 Petroleum engineers with an eye toward product improvement through accurate control of pH — acidity and alkalinity — will welcome the new pocket pH Meter made by the Scientific Instruments Division of Beckman Instruments, Inc.

Control of pH is important in many phases of the petroleum industry. The pH measurement of drilling muds, for example, is necessary to determine consistency, and help pre-

vent the corrosion of lines and other equipment. Instrument can be used, too, in spot checking automatic systems that control wash, waste, cooling tower, blowdown, and boiler waters.

This lightweight portable meter is ideal for convenient pH readings in the laboratory or plant, and may be readily taken into the field for immediate on-the-spot measurements.

A practical and unique feature of the meter is the combination glass and reference electrode, allowing the operator a free hand to make notations.

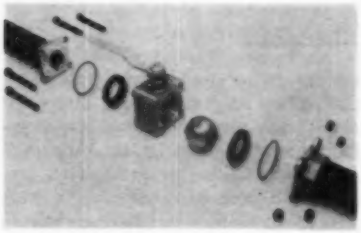
Meter, weighing 2 lb, is just 6 in. long, 3 in. wide and 2 in. deep. It has a handsome 2-tone gray case made of tough acid-resistant melamine plastic and a scratch-resistant polystyrene dial face.

Scientific Instruments Division, Beckman Instruments, Inc.

Valve and Union Combined

199 A new concept combines the function of a union and a ball valve in one compact unit.

With the use of this valve, the "Union-Ball" valve, the necessity of installing a separate union to provide a breaking point in the line is eliminated. In-line maintenance is also possible by

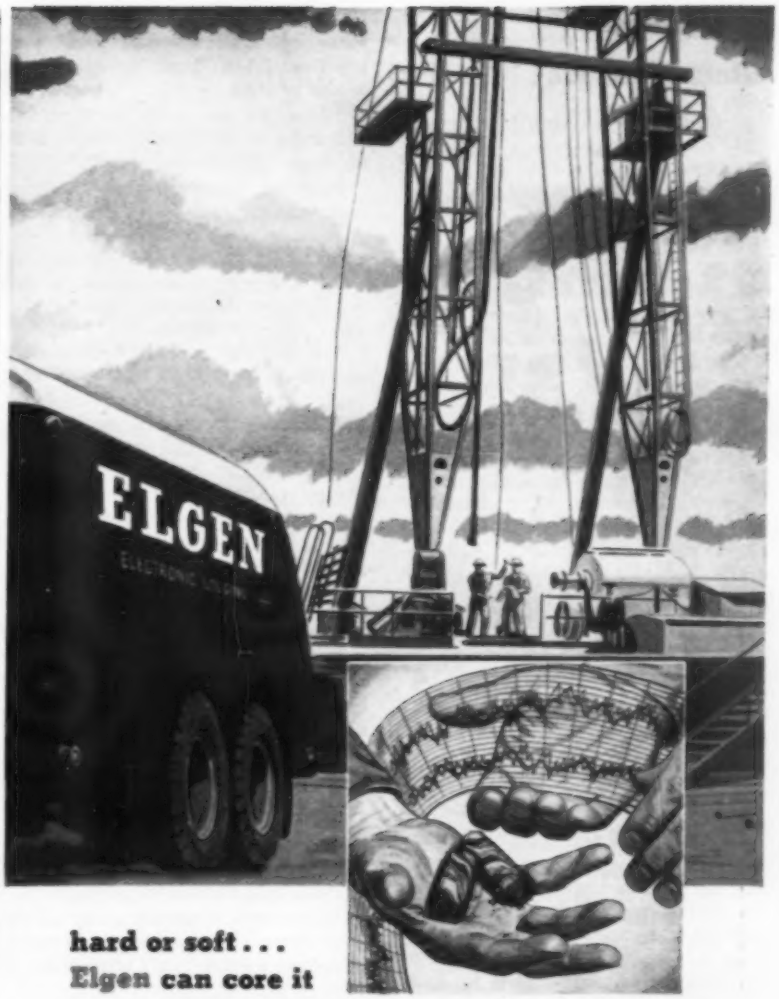


the simple expedient of removing 4 bolts, lifting the center section, which contains all renewable parts, from the line and making necessary replacements. With the opening in the ball and seat rings maintaining the same smooth shape as the inside of the pipe, resistance to flow is well below that of globe or gate valve and friction is reduced to a minimum. Operation of the valve is unaffected by reversal of flow, as the ball is fitted with twin seals, one on either side.

Metal components of valve may be bronze, aluminum bronze or aluminum. Steel valves will be available soon.

In order to accomodate a wide range of media, seat and seal materials may be of Buna-N, Hypalon, Neoprene, natural rubber or Teflon.

Worcester Valve Co., Inc.



hard or soft . . .
Elgen can core it

FASTER | BETTER | SAFER

Elgen controlled-depth cores give a closer look at production possibilities.

Elgen's side wall core services are the finest in the field. 1 to 30 zone selections in one trip . . . cores large enough for accurate analysis. Gun loading simplicity eliminates bulky field equipment, adds to speed of operation. Automatic gauges assure knowledge of tool operation. Exclusive circuit design and maximum safety devices are featured.

Remember — you'll get FASTER, BETTER, SAFER coring results with Elgen . . . and at less cost.

Write or call today. Your nearest Elgen representative, or Elgen's home office, will be pleased to show the many advantages in Elgen core services.

THE **ELGEN** CORPORATION
2925 MERRELL ROAD / DALLAS, TEXAS
FLeetwood 7-3958

Rare Earth Alloys Promise . . .

new strength for steel

New alloy steels developed for use as armor plate promise to give better performance to deep well casing, drill pipe, drill collars and sucker rods. New steels are made by alloying as little as ½ lb of rare earth metals such as lanthanum and cerium per ton of basic steel. This imparts many desirable properties to the metal, including substantially increased impact values.

While the new rare earth steels have not been used extensively in the production of oil country goods, they have an assured future if their performance in fields is any indication. Excellent results, for example, have been achieved by using them as armor plate for military vehicles.

The new steels have been subjected to many tests during the last 5 years and a number of advantages have been demonstrated. Among them are: (1) Lower transition temperatures, about 40 to 100 F, in the quenched and tempered condition. (2) Twenty to 60 percent higher values of reduction of area at all temperatures. (3) Superior impact properties at all temperatures, and (4) Identical hardenability to ordinary grades of steel.

Moreover, rare earth steels permit tempering in the so-called temper brittle range with adequate ductility.

How can these tests be translated into terms meaningful to the petroleum engineer? One of the tests was for the transverse V-notch charpy impact value of a 9 by 9 steel bloom, which is a common intermediate shape in the manufacture of tubing.

The test was conducted on a base analysis of steel, and compared with steel containing .15 percent of Lan-Cer-Amp, (other trade name rare earth metals are "L" metal and Hi-Lanth). Under test, the transverse charpy value of the rare earth steel represented an improvement of 88 percent at 80 F, 124 percent at room temperature and 132 percent at –40 F.

Impact tests were conducted on steel plate of varying thicknesses. The comparison in this instance was between a base analysis, and steel with a .10 percent addition of Lan-Cer-Amp, in foot-pounds at –40 F. Since tubing can be considered as curved plate, these results have unusual significance.

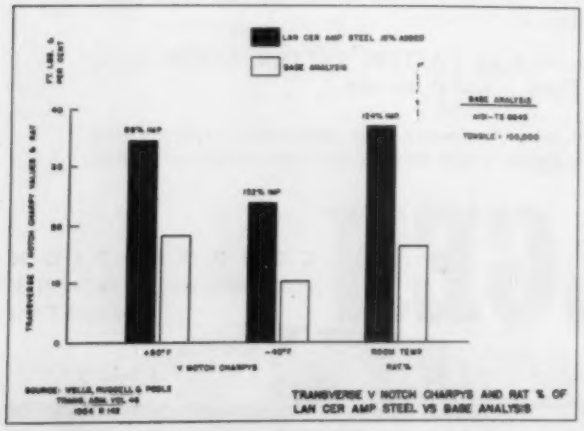
The rare earth steel represented a 70 percent improvement in ¼-in. plate (363 Brinell), 32 percent in ⅜-in. plate (375 Brinell), 34 percent in ½-in. plate (363 Brinell) and 44 percent in ⅝-in. plate (375 (Brinell).

A. Hurlich, formerly chief of the Watertown, Massachusetts, Arsenal's Materials Engineering Laboratories, is enthusiastic about the rare earth steels. In a paper, "High Impact Strength Steels for Low Temperature Service," presented in August 1955 at Syracuse University, he reported: "Considerable advances have been and are being made in the . . . use of rare-earth additions to steel to improve its ductility and low temperature toughness at high strength levels . . . the addition of 2 lb per ton of rare-earth metals to cast armor raised the low temperature (–40 F) V-notch charpy impact energy by 8 to 15-ft-lb over the same steel without rare-earth metal addition."

How do rare-earth metals increase the toughness of steel? Hurlich explained: "A research program conducted by the Steel Founders' Society of America under a contract to the Watertown Arsenal demonstrated that the increase in the toughness of cast heat treated alloy steels was due in part to the desulfurization . . . and to a change in the shape and occurrence of inclusions. These effects were not, however, able to account for the entire improvement in ductility and toughness in rare-earth treated steels. The strong affinity of rare-earth metals for oxygen, nitrogen and hydrogen must result in an effective degasification of steel, which may account for some of the improvement in its mechanical properties."

An important factor in any future increase in the use of rare-earth metals is their availability. Unlike nickel, chromium, vanadium, molybdenum and other strategic alloys, rare-earth metals are plentiful and more abundant than lead or tin. In fact, the armed forces turned to rare-earth steels primarily to beat the shortages of heat treated alloys that always come during emergencies. This same advantage will be of importance to the oil industry as the new steels come into widespread use. ★ ★ ★

New rare earth steels promise better performance when used to make country goods. This test on a 9 by 9 steel bloom, a common intermediate shape in the manufacture of tubing, indicates some of the advantages. Since tubing can be considered as a curved plate, these results comparing Lan-Cer-Amp steel with a base steel have unusual significance.


LAN CER AMP STEEL .10% ADDED
BASE ANALYSIS
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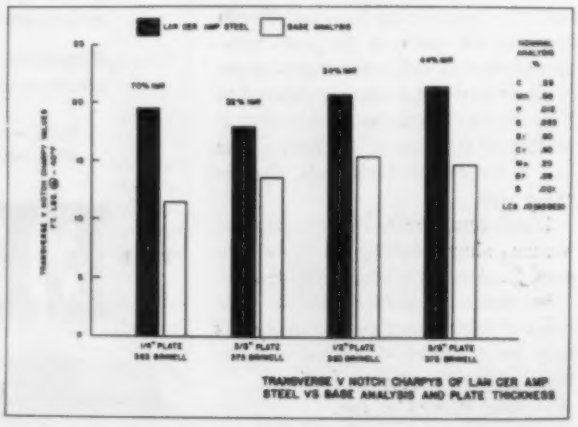
TRANSVERSE V NOTCH CHARPYS AND RAT % OF LAN CER AMP STEEL VS BASE ANALYSIS



Trailer Designer for Jungle

200 Trailers designed by the Pasko company will be used for hauling heavy oil exploration equipment through roadless jungles and swamps in South Africa. The flat top trailers, 24 ft long by 8 ft wide, will each carry up to 40 tons of equipment.

Caterpillar type bogeys used in place of wheels have a self cleaning system to remove sticks, mud, vines, and other materials that might foul the treads. Units are designed so that they may be end drawn or where required may be drawn sideways.

Since 1950, the company has been manufacturing trailers with capacities up to 50 tons for carrying cranes and bulldozer equipment, but this is the first new product for off-the-road use.
Pasko Machinery & Steel Company

Herbicide for Petroleum Sites

201 Ureabor, a powerful new weed and grass killer manufactured by the Pacific Coast Borax Company, has been specifically developed for use around petroleum installations, industrial sites, warehouses, storeyards, etc. It combines into one potent herbicide the proved weed-destroying characteristics of both the sodium borates and the substituted ureas. This combination makes possible good control of undesirable vegetation with relatively low rates of application. In addition to its direct herbicidal action, the sodium borate prolongs the action of the substituted urea by inhibiting its decomposition by soil microorganisms.

It is recommended for the control of both broad-leaf and grassy weeds. Suggested rates of application range from ½ to 2 lb per 100 sq ft, with the higher rates recommended on perennial species, or where the annual rainfall exceeds 35 to 40 in.

Another outstanding feature is the free-flowing, dust-free granular form which makes it ideal for dry application. This eliminates the necessity of expensive spray equipment or hauling water. It is nontoxic, when used as directed, nonflammable, and noncorrosive to ferrous metals. Ureabor can be safely and easily applied by hand broadcast, or by use of the new inexpensive PCB spreader. This hand spreader has been especially designed and enables one man to treat as much area per hour as can be treated with a 2-man operated power spray rig.
United States Borax & Chemical Corp., Pacific Coast Borax Company Division

Control and Sling Wire Rope Assemblies

202 Macwhyte Safe-Lock Wire Rope Assemblies are a new line of control cables with a wide variety of applications. They are a unit of flexible wire rope with permanently attached fittings of various types and sizes to make a complete operating flexible unit. These controls are used as a part of machinery and equipment or as slings and hoists.

Bright and galvanized carbon steel, stainless steel, and monel metal are used for the wire rope. Stainless steel terminals, mild carbon steel, and drop forged steel terminals are swaged to the ends of the rope, making a fastening stronger than the cable itself.

Engineering cooperation is offered in assisting with designing and developing special assemblies having special fittings attached at various parts in the cable to suit individual requirements.
Macwhyte Company

New Hydraulic Boost Pump

203 A new hydraulic boost pump for high-pressure work in the oil industry is offered by Sprague Engineering Corporation. New model S-216-C performs static testing on pipe and Christmas trees, ejects core samples, pumps out sanded-up pump barrels and will pump mercury.

Six standard models for output fluid pressures to 30,000 psi with oil or water operate on 100 to 150 psi supply air pressure. Boost pumps with capacities to 50,000 psi or for corrosive fluids are supplied on special order.

Sprague Boost Pumps operate automatically on the principle of differential areas. High hydraulic pressures are controlled by regulation of air inlet pressure. Pumps measure 8¼ in. wide by 9 in. deep. Weight is 20 lb.

Boost pump is also available in a portable unit (Model S-440) which includes air filter, air regulator, air gage, air lubricator, air shut off valve, air muffler, pressure gage and bleed off valve — all mounted on ½-in. steel base measuring 12 by 12 by 24 in. Weighs 45 lb complete.

This boost pump will quickly build up any desired pressure and then hold that pressure as long as required. Used for core ejections, sanded up pump barrels, static testing pipe and Christmas trees. Due to its additional ability to pump liquid only when it is needed to maintain pressure, it also automatically compensates for leaks or losses from the system.
Sprague Engineering Corporation

Torque Converter Rated 586 HP

204 Production of a new, higher capacity version of the Twin Disc 11,500 Series Three-Stage Torque Converter has been started by Twin Disc Clutch Company's Hydraulic Division.

Designated the Heavy-Duty 11,500 Series Three-Stage Torque Converter, the new unit has a maximum rating of 586 hp at 2200 rpm. Impellers are available for torque ratings of 340, 390,

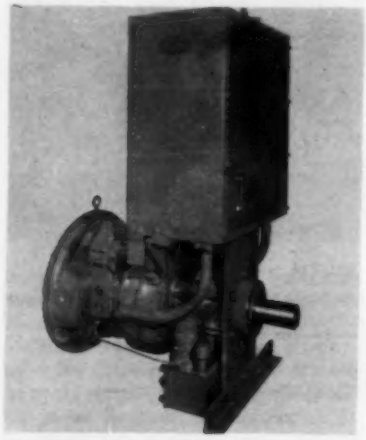
450 and 540 lb-ft. Maximum input torque is 1400 lb-ft.

Current production units include the Model CF, which provides a clutch at the flywheel, and the Model F, which is connected to the flywheel with a driving ring. Both types are designed for SAE No. 0 flywheel housings.

A Twin Disc C-3 Rear End, with the output shaft supported by two heavy-duty roller bearings, is available with either model, permitting maximum sidepull to be taken from the torque converter. Available as optional equipment is a radiator integrally supported as a part of the converter.

With the addition of the Heavy-Duty 11,500 Series Torque Converter, Twin Disc now offers three-stage units with ideal matching characteristics for engines rated from 40 to 1000 hp and from 700 to 2400 rpm.

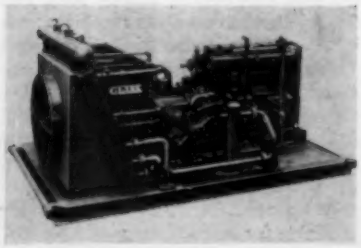
Twin Disc Clutch Company, Hydraulic Division



Completely Packaged Compressor Station

205 Clark CFA compressors are completely packaged compressor stations, available in 2 and 4-cylinder models covering the 100-350 bhp horsepower range. They have proved excellent units for air drilling, gas lifting, gas gathering, boosting, testing, repressuring, and a multitude of other oilfield services.

Packaged stations consist of either a 2 or 4-cylinder balanced/opposed compressor which is directly connected to an oilfield engine. Compressor and engine, together with a radiator, scrubbers, and other necessary accessories, are mounted on a rugged steel skid. From the standpoint of installation, vibrationless operations means that foundation requirements are slashed to the minimum. They are excellent units for swamp country as well as barge and truck mountings. For air drilling, the CFA can even be operated on timbers. For cooling, either separate engine and compressor radiators can be furnished or a unitized radiator can be supplied which handles all cooling services including engine jacket water, compressor cylinder jacket water, lube oil cooling, and as required inter and after cooling of the gas stream. All piping is confined to skid width for maximum protection during hauling. The CFA is highway width.



Mechanically, the CFA compressor features a steel crankcase, a 1-piece forged steel crankshaft, forged steel connecting rods, precision bearings, forced feed lubrication, and other important big compressor refinements. A wide range of compressor cylinders are available to meet practically any set of conditions. Each CFA is operated as a completely assembled unit at the factory.

Clark Brothers Company

Automatic Safety Shutoff

207 Installed directly in the flow line, this valve will shut off the flow of liquids or gases automatically should a line or hose break downstream from the valve. Operating from differential pressure, valve is equipped with an adjustable orifice to enable operator to set valve to any degree of sensitivity desired. Valve does not close

with a snap action but is so arranged that closing action is done slowly to prevent sudden jarring action. The valve, once closed is opened manually by using a high pressure grease gun.

Valve is ideal for safety device on flowing wells, automatic custody transfer units, loading racks for butane, propane, gasoline, etc.

Valve is available in pressure range to 10,000 psi and sizes 1 through 24 in.

McFarland Engineering and Pump Company

Long Stroke Hydraulic Unit

206 New, Tex-Lift keynotes low cost, minimum maintenance requirements, variable stroke speed control and ease of installation. Model 375-V will support a maximum polish rod load of 9500 lb while the Model 475 is designed for a maximum load of 15,000 lb. Either unit can be supplied with 6 or 12 ft stroke length. Regulation of the operating speed reduces a critical pressure drop as fluid enters the pump from the wellbore; hence, turbulent flow is dampened and water-cutting or gas-locking is less likely.

Unit screw or flange connects directly to the wellhead. A foundation is not required and the unit can be installed in short order with gin-poles or a pulling unit. True advantages are utilized in stripper production where it is important to operate with a stabilized fluid level. With a selection of stroke lengths, variable polish rod velocity and cyclic rate, the Tex-Lift permits synchronization of the formation feed and well withdrawal rate under controlled back pressure conditions. This critical control reduces pumping-down, pulling sand, water-coning or premature rod and tubing wear. A packaged power unit generates hydraulic pressure for the Tex-Lift.

Texsteam Corporation

Quick-Action Pins Cut Man Hours

208 Production assembly and many other types of operations are speeded up by the adaption of new pins which embody not only a faster lock and release principle, but an added positive safety lock feature as well. In field service, or wherever units are frequently disassembled, use of the new Ball-Lok Pin eliminates an important part of the costly man hours.

Pins are made to military specifications and are single action type, either push or pull, which permits simplicity of operation. No push type Ball-Lok Pin can be accidentally released; release button must be depressed to disengage the lock. Constructed of alloy steel, all models possess an exceedingly high strength in both shear and tension.

When the pin is inserted, or in a locked position, the chrome steel balls protrude beyond the body assembly, where they are firmly locked by the large diameter of the spring loaded plunger.

To release pin, pushing the release button allows the balls to sink below the diameter of the body assembly, leaving the pin free to be inserted or removed.

Manufactured by the D. W. Price Corporation, Ball-Lok Pins are available in a range of 8 models in 16 sizes. Units are shown in use on Joy Manufacturing Company's Portable Drilling Rig No. 225 to lock leveling jacks in up position for travel.

Rowe Sales Company

Cloverleaf Bit

209 This drilling bit, incorporating oversize cutaway sections, is designed for combatting the problem of sticking, frequently encountered in deep or sluffing holes. Large cut-outs permit the circulation of junk or loose formation off the bottom of the hole,

thus minimizing the possibility of damage when starting the bit or making a connection. This design also prevents swabbing of the hole or any hydraulic action when tripping.

Like all Christensen bits this design can be altered to meet the requirements of the rock to be drilled. Almost any combination of waterways and/or diamond pattern can be utilized, in either a three or four pad design.

Christensen Diamond Products

Flexible Plastic Coating

210 A new coating for metal that gives greater protection against chipping and peeling and has excellent resistance to acid and caustic fluids has been developed by Tube-Kote, Inc. It is called TK-33. The coating adheres to metal despite dropping, smashing or bending.

In laboratory tests, a 5 mil coating of TK-33 passes a ⅛ in. mandrel bend. This is another proof of the ability of TK-33 to move with the metal. Also, in a standard G-E Impact-Flexibility Tester, TK-33 coated aluminum pipe passes 20 percent elongation at 14.8 ft per lb impact.

The new product was developed to solve corrosion problems in pipe for gathering lines, salt water disposal systems, flow lines and similar uses. It is a unique formulation containing polyurethane.

Tube-Kote, Inc.

GREATEST ADVANCEMENT IN SWAB HISTORY!

The Oil States Swab is the most advanced swab on the market having been developed and perfected after years of research, painstaking work and engineering skill. It's acceptance has been overwhelming.

HERE ARE THE FEATURES YOU WANTED

★ Fewer cups to handle ANY job

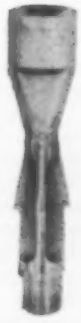
★ Responds to lightest loads

★ Swab can be EASILY UNLOADED at any time

★ Valve action from base of cup

★ Perfect for swabbing following frac jobs

★ Only 6 parts Required to Assemble a 2-Cup Swab



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(CUTAWAY)

Oil States

OIL STATES RUBBER CO.
ARLINGTON, TEXAS

One manufacturer reports . . .

Our Best Investment Is Standards

E. G. Unrath
Vice President, Manufacturing
The National Supply Company

In our constant struggle against the cost-profit squeeze, we have found one effective tool which perhaps is not as widely understood as it deserves—that is standardization. It includes the development of company standards, the application of ready-made national standards provided by trade and professional organizations, and our participation on the committees of these organizations in the formulation of new standards and revision of old ones.

The extent to which standardization is practiced varies greatly from one industry to the next, but I believe that there is no other industry that has achieved more in creating order out of chaos through standards than the petroleum industry.

In the early 1920's, practically every one of the more than 1000 manufacturers competing for the oil country business made his products as different as possible from those of his competitors. There was almost no interchangeability between the equipment and parts made by different manufacturers. Drilling operations were often interrupted for many days and even weeks because parts did not match or replacement parts were not readily available. Users and suppliers had to carry huge inventories, which were costly to maintain and which incurred heavy losses through spoilage and obsoletion. Lack of quality standards and of standard test methods encouraged "chiseling" on quality and price.

API Standards Program

The year 1923 represents a turning point. The American Petroleum Institute (API) organized its Central Committee on Standardization of Oil Field Equipment, which initiated a four-point program, covering: (1) Simplification of sizes and grades, (2) interchangeability between mating parts, (3) quality and performance of material, and (4) gages and gaging practices. The program relied on the voluntary cooperation and compliance of users and manufacturers.

It succeeded beyond the most optimistic expectations. The variety of equipment sizes and grades used in drilling and producing oil was reduced drastically—in some cases from several hundred versions to less than 20. API standards of sizes, threads, quality, grades, performance, and identification were established for practically every oil country product. A system of gage calibration was instituted, enabling manufacturers all over the world to manufacture accurately to API specifications.

Today master gages are certified by the National Bureau of Standards in Washington and by corresponding standards authorities in several other countries. A manufacturer producing to API standards can imprint his products with the official API monogram, which is registered with the U. S. Patent Office. Nearly 600 American and more than 200 foreign manufacturers have been authorized to use the API monogram. Interchangeability between competitive products for the oil industry is an accomplished fact throughout the world.

Company Follows Industry Example

The exemplary standardization program of the industry was a great encouragement for us to promote standardization within our own company. We are well advanced in standardizing the manufacturing end of our business; we have almost complete standardization in accounting; and we are in the course of introducing standards into purchasing, office systems, sales, and other operations.

In addition to The National Supply Company general offices at Pittsburgh, operations include 70 field offices and 128 oilfield supply stores in the U.S., Canada, and Venezuela; an export division in New York; two foreign subsidiaries; 19 foreign agents; and six manufacturing plants. Number of employees is about 9500.

Plants consist of two pipe mills in Ambridge and Etna, Pennsylvania, and equipment and machinery plants at Toledo, Ohio; Houston and Gainesville, Texas; and Torrance, California. Ambridge, our largest plant, has developed the most comprehensive standards program, and it may serve as an illustration of what we hope to achieve elsewhere.

Plant Product Standards

The Ambridge plant makes seamless tubular products, drill collars, sucker rods, and other specialties used in drilling and producing oil. About 80 percent of the plant's output is made to API or other industry standards. The balance is made up of specialty items for which no industry standards exist and of new products for which industry standards are being developed.

For each product, whether covered by an industry standard or not, a company standard is normally established before the product is put into production. Where a product is made to the API specifications, the company standard naturally conforms, but may also cover additional requirements. Where no industry standard exists for the complete product, the company specification incorporates to the greatest extent possible existing industry standards for certain properties of the products.

Tight Control System

All standards used in the plant are rigidly controlled by the Standards Department. Company standards for tubular products are issued in a special book to about 150 people in plants, offices, research, engineering, and sales. Each book is registered by number, and each bondholder is accountable for keeping it up to date. Void standards have to be returned to the department, and a delinquent bookholder is reminded until he complies. Thus, reference to obsolete material is avoided.

The Standards Department consists of a supervising engineer, who spearheads the standards program at the plant, and 12 other members, including engineers, draftsmen, specially trained veri-typists, duplicator opera-

tors, and clerical helpers. The unit is set up as an independent function. Today all matters relating to standards in the Spang-Chalfant (tubular) division, including two pipe mills, are channeled through, and coordinated by, the Ambridge Standards Department.

Industry Standards

The Ambridge Standards Department also controls the distribution of industry standards relating to our tubular business. The more important and most commonly used are distributed to about 100 company members. At Ambridge we use currently 16 API standards and 83 other industry standards.

Associations standards most widely used include the American Petroleum Institute (API), American Iron & Steel Institute (AISI), the American Society for Testing Materials (ASTM), and The American Society of Mechanical Engineers (ASME).

Engineering and Operational Standards

Standardization at Amridge covers engineering, production, systems, procedures, and office forms. Most product drawings have been standardized to an 8½ by 11-in. size. One illustration, with a dimensional data sheet keyed to it, covers all sizes of one product. This represents a tremendous saving compared to our procedures some 20 years ago, when often as many as 50 drawings, in an assortment of four sizes, were made to cover the various specifications of only one size product.

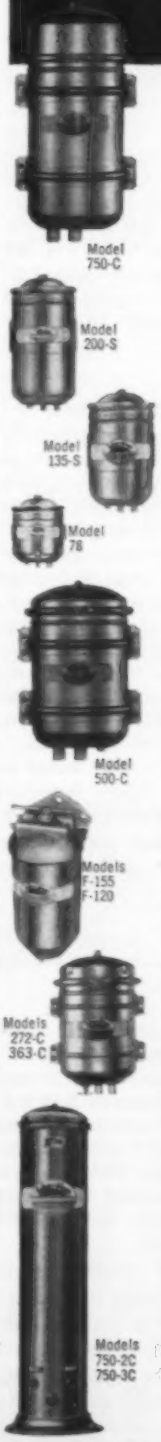
All production operations are defined and listed on operational sequence, which are numbered on a master list. For each product, standard sheets are available, listing the sequence of the operations by number. Standard part numbers are established to identify the various sizes, weights, grades, threads, and joints of the finished products. These numbers are used and followed in scheduling, production, material handling, rate setting, reporting, cost accounting, and inventory work.

Standards for Purchasing

All plants have their own purchasing departments, and overall plant purchases are controlled by the Director of Purchases at the general offices in Pittsburgh. A program for greater standardization in purchased products is well advanced.

By far the largest item bought is steel for manufacturing operations. Most products could be manufactured from several types of steel. However, we have now achieved standardization of our steel purchases with the result that for each one of our standard

THERE'S A LUBER-FINER MODEL FOR EVERY TYPE OF ENGINE FOR EVERY TYPE OF OIL!



ONLY A GENUINE Luber-finer PLUS A GENUINE LUBER-FINER PACK

CAN GIVE THE EXCLUSIVE PATENTED FILTERING PROCESS THAT HAS MADE LUBER-FINER THE Standard Of The Industry Since 1936

MODELS 78, 135-S, 200-S, featuring single-bolt lid, screw-in type pack, and overall compact design for use where space is limited. These Models provide the ultimate in filtration for passenger cars, small trucks and tractors, and other similar engines up to 5-quart, 6-quart, and 7-quart crankcase capacities.

MODELS 272-C and 363-C, featuring the Luber-finer single-bolt lid clamp, O-Ring lid gasket, screw-in type pack, and rugged construction throughout. Designed for heavy-duty service on gas, gasoline or diesel engines up to 3-gallon and 4-gallon crankcase capacities.

MODELS 500-C and 750-C, featuring the Luber-finer single-bolt lid clamp O-Ring lid gasket, large-capacity packs, and extra rugged construction to withstand the most severe service. Designed for use on gas, gasoline or diesel engines up to 5-gallon and 8-gallon crankcase capacities. Also widely used on fuel lines, hydraulic oil systems, and many other industrial applications.

MODELS 750-2C & 750-3C, featuring the Luber-finer single-bolt lid clamp, O-Ring lid gasket, and multiple packs for extra large capacity. Available with either wall or floor mounts for industrial use on engines up to 35-gallon sump, fuel lines up to 15 GPM, hydraulic oil systems up to 450 gals. For larger capacities, two or more Units can be connected in parallel.

MODELS F-120 and F-155, for gasoline and diesel fuel lines on mobile, stationary, or marine applications. Extremely efficient in removing impurities and contaminants from fuel. Single Units will handle flow rates from 0.5 to 1.0 GPM on suction or gravity flow. For larger capacities, connect two or more Units in parallel, or install on pressure-side of fuel pump.

GENUINE LUBER-FINER PACKS available in two types...

DIESELPAK — Expressly designed and recommended for use with all detergent-type compounded oils. Has the ability to remove the most finely dispersed contaminants without removing or affecting the additives.

REFINING PACK — For use on straight mineral oil, synthetic oils, diesel fuel oil, hydraulic fluids, etc.

★ THERE IS A GENUINE LUBER-FINER MODEL FOR PASSENGER CARS, TRUCKS, TRACTORS, STATIONARY AND MARINE ENGINES, HYDRAULIC OIL SYSTEMS AND MANY INDUSTRIAL APPLICATIONS.

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LUBER-FINER, INC. 2514 S. Grand Ave., Los Angeles 7, Calif

manufactured products we buy only one type of steel, of a specified bloom, analysis, size, and weight. With a standard raw material, we can employ systematical production processes to always obtain the same standard end product.

We are also making progress in standardizing maintenance requirements, repair and operating supplies. We are now using only one cutting oil in all plants instead of 10 and have reduced the number of cutting tools and tool steels. Since no industry-wide standards exist for this material, we selected as standard certain grades made by several manufacturers to be able to buy competitively.

This program for purchases is established as a general policy, but does not necessarily have to be followed by a plant purchasing agent if local conditions made an exception advisable. However, practically all suggested purchasing standards are eventually adopted. Moreover, the Purchasing Director encourages the plant purchasing agents to keep abreast of standards activities by reading literature on standards published by the National Association of Purchasing Agents and by attending meetings. Although NAPA does not develop and write standards, it is one of the most active organizations in promoting the use of standards in American industry.

Accounting Standards

Some of the most useful standards are set up by our Accounting Department. They are standard production costs, based on standard production times and standard material requirements for manufactured products. These serve as a yardstick for plant operations. If Accounting shows up a variation from the mean, we can be sure that something has occurred in our production that needs investigating.

The Accounting Department has also introduced throughout the organization standard accounting methods and forms, including records and financial statements. In view of the several hundred individual operations scattered all over the world, these standards are invaluable. They not only reduce the cost of keeping accounts, but they also make it possible to have inventory figures and financial results available much earlier than was the case with nonstandard methods previously used. We are thus able to make more promptly decisions on production, purchases, sales, and general company policy.

Savings Through Standards

One question that is most frequently asked in connection with a standards program is, "How much do you save through the use of standards?" This is the question most difficult to answer.

Some years ago, API estimated that the oil industry saves about 10 percent on all its purchases of equipment covered by API standards. Annual value of such equipment was estimated in 1953 by the late C. A. Young, API director, at $750 million. Today it has probably exceeded $1 billion. Thus, yearly savings of the oil industry through API standards alone would be about $100 million. I feel, however, that this estimate is very conservative. If in our Ambridge plant we would be requested to make a special product that is not covered by an API or another of our standards, we would probably have to charge at least 25 percent above the regular price of a comparable standard product.

In addition to the saving in manufacturing, we also save through buying of standard products and through standardized production flow, engineering drawings, accounting methods, and other systems. It is impossible to estimate the exact savings, because such standards were introduced gradually, and many other factors, besides standards influence costs. It is significant, however, that the percentage of our company profits in relation to sales has recently shown a decided upward trend, and no doubt our standards activities as part of our overall cost reduction program has been a major factor in this development.

Investing in Standards

I think one of the best proofs of how much standards are worth is our participation in national standards activities. We are dues-paying members of the API, ASTM, AISI, NEMA, NAPA, and ASA. We subscribe to all association standards that have a bearing on our business. More than 20 of our executives are at any one time active members of standards committees and subcommittees of these national associations. This represents a substantial expense to the company in executive time for committee meetings and for "home work" between committee meetings, as well as in actual traveling costs.

We firmly believe that these costs are small in relation to the returns obtained. Standards are surely one of our best investments! ★ ★ ★

Fire Hose Weight Reduced

211 A new fire hose with increased flexibility and reduced weight has been developed by Hewitt-Robins, Inc. for use in chemical plants, oil refineries, and the marine industry.

Hose has a carcass of dacron and cotton fabric with unusually high tensile strength, and a Neoprene synthetic tube which makes the hose suitable for water or oil service. The cover is a newly developed Neoprene compound highly resistant to heat, flame, acids, oxidation and abrasion.

Built to withstand pressures up to 500 lb, the hose is resistant to oil, gasoline and chemicals. It is easier to handle and requires no drying time. It will be marketed under the name of Monarch Chemoil fire hose and will be available in diameters of 1½ and 2½ in. A special 2-in. size can be manufactured on special order.

Hewitt-Robins Incorporated

Petroleum First Aid Kit

212 An entirely new First Aid Kit has been developed by E. D. Bullard Company for use by men working on drilling rigs. Equipped with emergency first aid equipment for 15 men it weighs only 5 lb and contains quantities of plastic and adhesive bandages in unit packs.

Petroleum first aid field kit was designed according to suggestions made by men in the drilling business. This kit contains the first aid supplies needed to treat accidents most often occurring on drilling rigs.

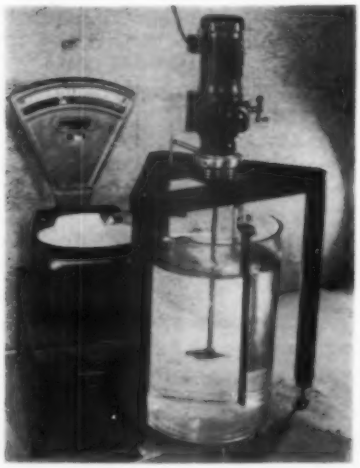
Also included in this kit is an "Instant Guide to First Aid" card, giving full instructions for first aid treatments, the control of bleeding and how to give artificial respiration.

E. D. Bullard Company

Mixing Non-Newtonian Fluids

213 A new dynamometer accessory for the ELB Experimental Agitator permits the user to directly determine required horsepower for mixing non-Newtonian fluids and gas-liquids. Until now, horsepower requirements for these classes of fluids could only be estimated.

The accessory consists of a 3-leg stand with adjustable leveling feet, a ball thrust bearing mounting for the ELB mixer, and a moment arm assembly which pivots from a bracket fastened to one leg of the stand. Motor torque is transmitted through the arm to the pan of a laboratory scale, where the amount of the force is displayed in pounds. Horsepower is determined accurately and simply by substituting derived values in the standard horsepower formula.



The accessory, together with the ELB Experimental Agitator Kit, provides a laboratory tool for fast, accurate scale-up of mixing processes involving both non-Newtonian and Newtonian fluids, with maximum control over all variables.

Chemineer, Inc.

Rodless Oil Well Pumping

214 Sargent Engineering Corporation cognizant of the fact that more oil must be produced from deeper wells, now offers a totally new type of bottom-hole rodless hydraulic pumping.

New pump is designed for either concentric or parallel string, free pumping. Long stroking bottom-hole rodless pump is operated by fluid or power oil from a triplex on the surface. This down-hole hydraulic free pumping unit is inserted and pumped down to operating position on the bottom of the well. It is extremely simple in design, effective in performance and almost unlimited in application.

New unit works equally well in straight, slant, crooked, shallow, or deep wells. Tubing wear caused by sucker rod friction is eliminated. Sargent rodless bottom-hole pump is constructed essentially the same as the time proved conventional bottom-hole rod pump except that the unit has a simple, positive mechanism to reverse the flow of power fluid. Fewer moving parts, integrated into a smoothly functioning unit, give the Sargent rodless pump optimum performance under a wide range of well conditions.

In marginal areas or where curtailment is in effect, a number of wells can be powered by the same unit at a considerable saving in surface equipment. Large groups of wells operating under curtailment can be pumped intermittently, thus eliminating the purchase of costly units that would be used only part time.

The Sargent rodless hydraulic pump gives maximum compression ratio because of its long stroke and positive and accurate spacing of the traveling and standing valves. These two factors also minimize gas locking problems in the production pump and eliminate the guess work of valve spacing in pump operation.

Sargent Engineering Corporation

DAVIS

Continuous combustible gas alarm systems

REMOTE HEAD
AND TUBE SAMPLING TYPES

A complete line of Davis Gas Alarm Systems, together with a number of accessories, is available to meet varying requirements in protecting life, property, and processes against the explosive hazards of combustible gases and vapors in air.

They function by means of automatic continuous sampling of the flammable gas-air mixture, and give audible and visual signals when the gas concentration approaches dangerous limits.

Davis also offers special equipment designed to meet particular requirements or applications.

For complete information, write for Technical Bulletin 11-36

INSTRUMENT DAVIS DIVISION

DAVIS INSTRUMENTS

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Progressive Manufacturers of Gas Analysis Instruments

SAVE with *Enniscope*

ELECTRONIC CONTROLS

● Enniscope Fluid-Level Indicators and Tank Bleeders are designed for any tank. And are unaffected by fluid gravity, viscosity, or pressure. They are used for indication, warning, motor starting, or as a completely automatic control system when coupled with valve control and timer. No other system gives such dependability and safety. Write for our new Data Folio today. Have the specifications on hand when you begin to modernize — and economize.

THE NEW ENNISCOPE INTERFACE SENSING INSTRUMENTS

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- **Automatic Fluid Level Control**
- **Automatic Interface Indicator**

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WATER IN Enniscope INSTRUMENTS

New Cementing Aids

215 Two new cementing products have been introduced by the recently formed Hub Oil Tool Company of Shreveport, Louisiana. One, the "Coil-Flex" wall cake remover, on which the patent is pending, employs an entirely new principle. Using over-lapping coils of oil tempered spring steel wire, it reaches out and makes double contact with every portion of wall surface. Yet it does not scratch the wall cake when going into the hole.

Photograph shows models of the wall cleaner in two positions. The upper one is relaxed as when going into the hole; the lower one is in the flexed position as when it performs cleaning action. Flexing is achieved by drawing up on pipe, causing feelers to engage the wall while the lower collar, being attached to the pipe, compresses the coils forcing them outward.

Large openings between coils permit mud cuttings and shale to pass freely without clogging. During cementing, the "egg beater" action of the coils maintains the cement at a uniform viscosity, increasing the efficiency of the circulating pump.

The other new product is the "Sta-Tru" latch-on type centralizer. The hinged sleeves are made in one piece without use of welded-on cylinders. They are designed for easy latching operation and extra strength.

Hinge pins are countersunk so that heads are flush with sleeve edges permitting them to seat evenly on the collar.

Hub Oil Tool is headed by F. F. Lewis, a veteran of 37 years in the oil business who has, since 1945, represented the major companies in the field of scratchers and centralizers.

Their factory, located in Cotton Valley is also manufacturing casing scrapers and conventional scratchers.

Hub Oil Tool Company

Pneumatic Controller

216 Of special interest to the petroleum and chemical fields, is Taylor's new "Transcope" Pneumatic Controller. It provides an extremely accurate, compact (6 by 6 by 4½ in.) means of maintaining a given set point by relaying measured variables for subsequent corrective action via a final control element such as diaphragm valve lever motor, etc. Its inherent characteristics make the "Transcope" ideal for the varying time constants of modern processing and for short span measurement.

New both in concept and execution, the controller makes unique use of the motion-balance principle through interconnected multiple bellows and springs acting on a common force plate. Primarily for back-of panel board application, the plug-in feature makes possible mounting to a separate manifold located either at the point of measurement or the point of control. It has an integral cut-off relay which makes this possible. It also offers a complete interchangeability of unit parts. Available with single, or multiple control responses, conversion from one to the other is easily accomplished — even in the field.

Highly desirable factors of installation and maintenance are the ease of alignment and quick response to adjustment, coupled with definite ability to "stay put." Clean design plus rugged construction, featuring stainless steel, brass and aluminum throughout, accounts for a high degree of insensitivity to ambient temperature, and low air consumption. This also provides a virtually fume, dust and moisture-proof unit which can be mounted almost anywhere.

Taylor Instrument Companies

Baked-On Plastic Coating

217 An entirely new composite baked-on plastic film for field tubular goods has been developed by Plastic Applicators, Inc. Said to provide a new high standard of resistance to acid and alkali attack, as well as unusual flexibility and impact strength, the new film, called Plasticap "AB," is the result of several years of research and development.

Tests have shown the advantages, under certain field conditions, of combining phenolic and modified phenolic baked-on films. This fact led to the development of Plasticap "AB," especially recommended by the manufacturer for use in gas condensate wells, sour-crude wells, high-pressure sweet-crude wells, and wells making salt water and salt-water disposal and waterflood systems.

Dual strings offer no complications with baked-on plastic coatings. Each string is individually protected by its own internal coating without modification of conventional oil production processes. The smooth, hard surface of Plasticap "AB" is said to provide a further economy in reduced frictional resistance to flow.

Plastic Applicators, Inc.

British Portable Seismograph Introduced

218 A newly designed portable seismograph, developed by the University of Cambridge, England, and combining the rugged, compact construction of a field instrument with the delicate sensitivity of an observatory model, is now available in the United States.

Produced by Hilger & Watts Ltd., British instrument manufacturer, the Watts Willmore Pattern Seismograph records for up to 24 hours at 60 mm per minute, with needle-sharp definition, and is designed for a variety of geophysical applications including blast recording, rockburst studies, study of earth shocks related to volcanic activity, teleseismic work, plus other applications within the construction and petroleum industries.

The seismograph's portability and simplicity of operation make it ideal for field use. Among typical applications is the determination — at proposed construction sites — of subterranean vibrations and stresses to which a structure or foundation may be subjected.

The seismometer unit is sealed in a waterproof, metal case which permits burial in open ground, and is easily convertible from horizontal to vertical operation. The self-contained recorder unit operates on any level surface, in full daylight, and features a built-in calibrator and step attenuators which provide known response characteristics at all frequencies.

Jarrell-Ash Company

Surface Set Diamond Bits

219 A new line of surface set diamond coring bits is now available from Diamond Products, Inc.

Trade named Drillco, the new coring bits are made in all qualities of West African diamonds and are furnished in DCDMA standard sizes from EXT on up to 7¾-in. diameter. Manufacturer states that these new surface set bits have been thoroughly field proved through extensive testing and are now available for immediate delivery.

Diamonds are set in a choice of 3 types of advanced powered metal matrices: Standard Matrix—for non-abrasive, relatively solid, good coring formation. Hard Matrix — for somewhat abrasive or fair coring formation. Super Hard Matrix — for extremely abrasive or badly broken and difficult coring formation.

Diamond Products, Inc.

Electric-Hydraulic Motor Valves

220 Powerful electro-hydraulic, motor-operated valves for efficient remote control of all industrial liquids and gases—shut-off, three-way and proportioning control—are manufactured by General Controls.

Hydramotor Valves, available in three operator sizes and in wide range of body types and sizes (⅜ to 12 in. per sec and operating pressures up to 6000 psi) are employed in a wide group of applications. Integral electric motor-operated hydraulic pump drives spring-loaded piston to operate valve; opened circuit or power failure allows spring to return valve to normal position. Featuring fail-safe operation and two-wire control, time-tested Hydromotor Valves provide a safe, dependable and durable answer to all liquid transfer problems.
General Controls Company

Oil Field Float

221 Production of the new "808 Oil Field Float," a light weight heavy-duty oilfield trailer, is announced by Spencer-Safford Loadcraft, Inc. The new heavy-duty oilfield trailer weighs less than conventional trailers, yet is rated for as much as 5 tons more payload.

Trailer is designed for 3-point stability in nose loading. It has an over size rolling tail pipe with self-aligning bushings for rear loading. Double pivot keeps the load in balance and combination bar-spring tandem principle provides flexibility for light loads with a gradual "stiffening-up" under heavy loads as the springs deflect against the bar.
Spencer-Safford Loadcraft, Inc.

Transistor Tone Telemeter

222 A new type of transistor tone telemeter developed by Warren Manufacturing Company, Inc., has been in operation for over a year in the New England area. Designated TT1, the system is also in operation for centralized monitoring and control of temperature, pressure, flow, level and valve position at remote locations in many other applications.

Field tests reveal a high degree of reliability with transistor circuits. Sharply notched bandpass filtering permits allocation of tone channels 120 cycles apart. Tone signals may be applied simultaneously as a composite signal to any private open wire, cable, radio or microwave system, hence multiplying telemetering circuits.

The equipment employs PNP junction type transistor tone oscillator transmitters operating in 18 frequency channels between 420 and 2460 cps. These transmitters are keyed independently by any circuit closure end device and the pulsed tone output applied to a single transmission medium on a frequency multiplexed basis. At the receiving location each tone is selectively received by TV1 receivers. Through three stages of transistor amplification, these tones are made to operate directly individual power control relays associated with each receiver. These telephone-type relays contain single-pole double-throw contacts rated at 10 amps at 115 volts a-c or 27.5 volts d-c.

Relays are plug-in and can be supplied for either high current-low speed or low current-high speed applications. Frequency determining filters for transmitters and receivers are also plug-in.
Warren Manufacturing Company

Nothing drills like a
SPANG
DRILLING BIT
Performance Records show . . .
● More Footage
● Lower Costs
● Fewer Failures
It doesn't take drillers long to recognize a good thing. Look around you at the record breaking number of Spang Bits being used . . . convinced? . . . then go SPANG TODAY!
ENTIRE BIT DIE FORGED
COMPLETELY HEAT TREATED
SEMI-DRESSED ENDS
For Cable Tool data and catalog see your Spang dealer or write to:
SPANG & COMPANY
DEPT. O-7 BUTLER, PENNSYLVANIA
For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Prospect Drilling and Shot Blast Holes.

Remote Control Operates Vehicle

223 Lear, Inc., has introduced a unique system for remote control of vehicles. Equipped with the Lear system, a vehicle may be used for obtaining data or information from remote, hazardous, or otherwise inaccessible areas via a television transmitter. The system is easily installed in any tracked or wheeled vehicle and uses electromechanical actuators to control the functions usually performed by the driver. The vehicle may be controlled by radio or through an electrical cable which permits a variety of driver locations. Ordinary manual operation of the vehicle is not hampered, and quick switch-over from manual to remote control is easily accomplished.

A push-button starts the engine, and an aircraft-type control-stick steers the vehicle with right-and-left movement at the same time that it controls the throttle with fore-and-aft movement. Moving the control stick all the way to the rear position applies the brake. Other push-buttons on the control box shift the vehicle into any gear selected by the operator.

The rugged system was designed to operate under the most extreme environmental conditions. It has been used in actual testing of US Marine Corps landing vehicles under dangerous surf conditions. In this application, the LVT was controlled by radio from a hovering helicopter or from an observation post on the beach.

Lear, Inc.

Lubrication of Roller Bearings

224 A new and positive method for central lubrication of spherical roller bearings has been introduced by SKF Industries, Inc. This feature, which is available on all "Type C" Spherical Roller Bearings 140 mm and larger, allows the oil or grease to penetrate directly into the center of the bearing where it does the most good.

This is accomplished by means of a circumferential groove in the center of the outside diameter of the outer ring with equally spaced holes drilled in the groove. As the lubricant enters the center of the bearing, all working surfaces are quickly and completely covered. In addition, the outward flow flushes away the old lubricant, and with it, any abrasive dust, dirt, moisture, or other impurities. Where circulating oil lubrication is required, there is also a continuous flushing and cooling of the bearing.

SKF Spherical Roller Bearings with this new method of lubrication can be used in any existing housing simply by drilling and tapping a new hole for the lubrication fitting in the center of the housing and plugging the original hole on the side.

SKF Industries, Inc.

Literature Round-Up

New Pump Bulletin

225 New Johnston Submersible Pump Bulletin describes Johnston Pump Company submersibles with 4 to 7-in. bowls, horsepower ranges to 20 hp and capacities to 375 gal per min.

Johnston Pump Company

Cementing Tables

226 "Uniflo Oil-Well Tables" is the title of a new pocket sized hand book on oil well cements which is being offered by the Universal Atlas Cement Company. This technical booklet is designed for use in cementing operations and includes considerable data on the various types of cement and the effect of various additives on thickening time and pumpability. Pipe data and capacity of hole, annular space and other down-hole factors are included to assist in the many calculations made in the performance of cementing and plug setting operations.

Universal Atlas Cement Company

V-Drive Catalog

227 Production men, design engineers and other users of V-Drives will find the new 46-page Maurey V-Drive Catalog a convenient source of information on fractional horsepower V-Drives and drive parts and accessories. In the range of fractional to 10 hp, this modern, colorful, and well illustrated book presents easy-to-read descriptions and complete size data on the Maurey line of bushed type and fixed bore type cast iron and pressed steel V-pulleys, V-belts, fans and fan pulleys, and V-drive accessories. A special page is devoted to Maurey Interchangeable Bushings. Other special pages show action pictures of both Maurey fractional and multiple V-Drives. Final section of the book is a 9-page Engineering Data Section informative to the user who seeks to select the proper drive for his particular requirements.

Catalog Division, Maurey Manufacturing Corporation

Aluminum Piping

228 Aluminum pipe for tank and vessel hook-up is the subject of a new, illustrated brochure published by Reynolds Metals Company. Featured are handy reference tables scheduling sizes and specifications of pipe available through leading distributors across the nation.

Aluminum piping products are manufactured to standard pipe sizes, according to the brochure, eliminating costly conversions and special fittings. The smooth interior of the piping insures lower pressure drops and higher flow efficiencies. Initial costs of aluminum, the company states, are less than steel. Actual examples comparing costs of similar installations — one using steel piping and the other aluminum — are included. Aluminum piping, it is pointed out, is impervious to all kinds of weather conditions and does not require paint for protection. Virtually maintenance-free, aluminum cannot rust inside or out, and has superior resistance to corrosion from water, sour gas, soils, hydrogen sulfide, carbon dioxide, nitrogen solutions, and other fluids which quickly corrode other metals.

Title of the brochure is "Reynolds Aluminum Pipe for Tank and Vessel Hook-up."

Reynolds Metals Company

Integration of Computer Into Systems

229 A 4-page illustrated report is being issued by Bendix Computer Division describing how a Bendix G-15 General Purpose Computer has been integrated into a customer-engineering-manufacturing system, simplifying the calculations and layout work required in the design.

Greatest immediate benefit is the ability to quickly explore the full range of design possibilities and to materially reduce the engineering hours required to produce a working drawing. Time savings in the approximate ratio of 22 to 1 are obtained.

Bendix Computer Division, Bendix Aviation Corporation

Describes D-C Timing Motors

230 The A. W. Haydon Company has released a new bulletin to be inserted in their current catalog. Bulletin AWH MO 805 contains information on the function of the three basic d-c timing motors, along with a detailed explanation of construction and operation. Featured in this bulletin is a cut-away view of the basic d-c timing motor, showing the rotor construction and self-contained gear train.

The 5300 Series motor is available in voltage ratings from 4½ to 30 v and is designed for general duty d-c applications where a timing motor is required.

The 6300 Series motor is designed for operation directly in electronic circuits and features a no-load current under 10 milliamps at 45 v. This low current together with a high impedance rotor winding, allows operation directly in the plate circuit of many electronic tubes.

Bulletin sheet is clearly blocked out, with readable size type and illustrations.

The A. W. Haydon Company

Catalog on Power Units

231 A new, graphically-illustrated 12-page catalog on its line of 6 new and increased horsepower 6-cylinder carbureted power units has just been announced by International Harvester Company. Booklet devotes a page of space to each of the 6 recently-introduced units, which are presented with handy power and fuel consumption curves. Cutaway views of components spotlight various advantageous features of the units. Two pages are reserved for brief specifications of the units, disclosing performances on gasoline, LPG or natural gas.

Construction Equipment Division, International Harvester Company

Hydraulic Power

232 A 52-page catalog on hydraulic power units, including pumps, cylinders, pressure switches and accessories, has been published by Oil-Dyne, Inc.

Catalog contains complete technical data and specifications on 2240 different types and models of Oil-Dyne pumps, single and duplex pressure switches, hydraulic cylinders and a full line of accessories including tube connectors, valves, hydraulic hose and fittings, tubing, and gages.

Specification data charts which can be filled out by prospective users of Oil-Dyne equipment to secure prompt quotation and recommendation for the proper unit for any application are also included in the catalog. Oil-Dyne hydraulic units, designed to develop maximum power output from a unit of minimum size and weight, were introduced less than a year ago. These miniature units, measuring only 8 to 10-in. in height, depending upon motor size, provide finger tip control of ample hydraulic power. Oil-Dyne units are available for pressures to 3000 lb, with peaks up to 5000 lb.

Oil-Dyne, Inc.

POLYMARINE MODEL WB-387

RUFNEK

38-FT. CREWBOAT AND RIG TENDER

Virtually indestructible fiberglass-reinforced plastic hull.

This versatile, 18-passenger Polymarine-built service launch is designed for long life and low maintenance in heavy industrial service.

POLYMARINE construction will not rust, rot, or dent under impact. Damage from a severe collision is easily repaired in the field.

Send for literature and ask about 25-ft. twin outboard, 6 passenger of similar construction.

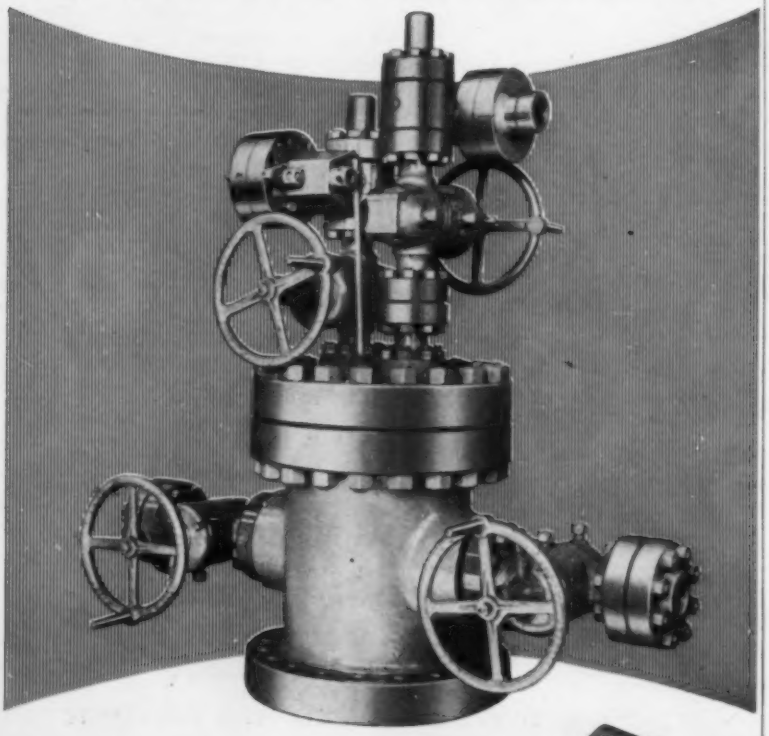
LOA	37' 6"
BEAM	13' 8"
DRAFT	3' 3"
SPEED	30 mph
POWER	Twin Diesels
REDUCTION	Paragon 1.5/1

POLYMER ENGINEERING CORPORATION

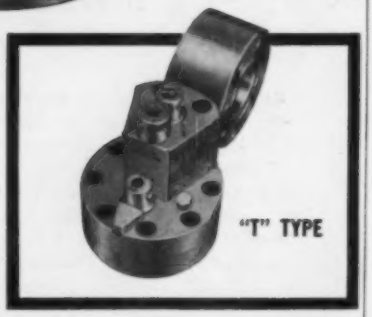
1100 HOUSTON CLUB BUILDING | HOUSTON 2, TEXAS

ADJUSTABLE FLOW CONTROL

with pre-determined accuracy!



Simplify
Dual Completions
with
WILLIS
Rotary Adjustable Chokes



Willis Rotary Adjustable Chokes provide 6 different size choke inserts which are individually positioned in the line of flow by a fractional turn of the orifice—carrying disc... while under constant flow and high pressure. Simplicity of this uncomplicated Christmas tree (note deletion of wing valves) is accomplished by using a blank orifice in one of the 6 positions of the Willis Rotary Chokes for shut-in without closing the master valve.

WILLIS OIL TOOL COMPANY
3440 Pine Avenue, Long Beach, California
Houston: P. O. Box 12164 Park Place Station; **Odessa:** P. O. Box 412;
Canada: Precision Oilfield Service, Ltd.; Edmonton, Alta.

Electric Generating Plants

233 D. W. Onan & Sons Inc. has revised their "Blue Book" of general information concerning the selection of engine driven electric generating plants. The pocket sized booklet traces the history of electric plant development from early stages where storage batteries were necessary to today's modern single-unit, engine-generator power plants.

Described in simple, easy-to-understand language are the three general groups of electric plants: Alternating current (a-c), direct current (d-c) and battery charging. Plant operation for each type is thoroughly discussed.

Booklet reviews the three types of prime movers which furnishes the mechanical power for driving the generator, namely: Gasoline engine, diesel engine and gas engine. Cost of operation and installation of each type is discussed. Differences of engine cooling are compared, starting methods are described and a concise summary of important points to remember in selection of an electric generating plant is also included.

D. W. Onan & Sons Inc.

Seismic Data Processing Equipment

234 Descriptions of "seisMAC," electronic seismic data processing computer, and its related equipment for central office processing, are contained in a new 8-page brochure now available from Texas Instruments Incorporated, Industrial Instrumentation Division.

By automatically correcting for weathering, elevation and normal movement, "seisMAC" reduces routine computations of seismic data to a minimum. This eliminates errors which may have been caused by the human factor. The corrected records present data in a form which permits faster, more accurate interpretation.

In addition to detailing the economic and technical advantages of the TI-Central Office Processing system, the bulletin contains descriptions of such other components of the systems as "magneDISC," disc-type magnetic recorder; the 7000B all-purpose amplifier, and the T-Z (time-depth) camera, which also are manufactured by Texas Instruments.

Texas Instruments Incorporated, Instrumentation Division

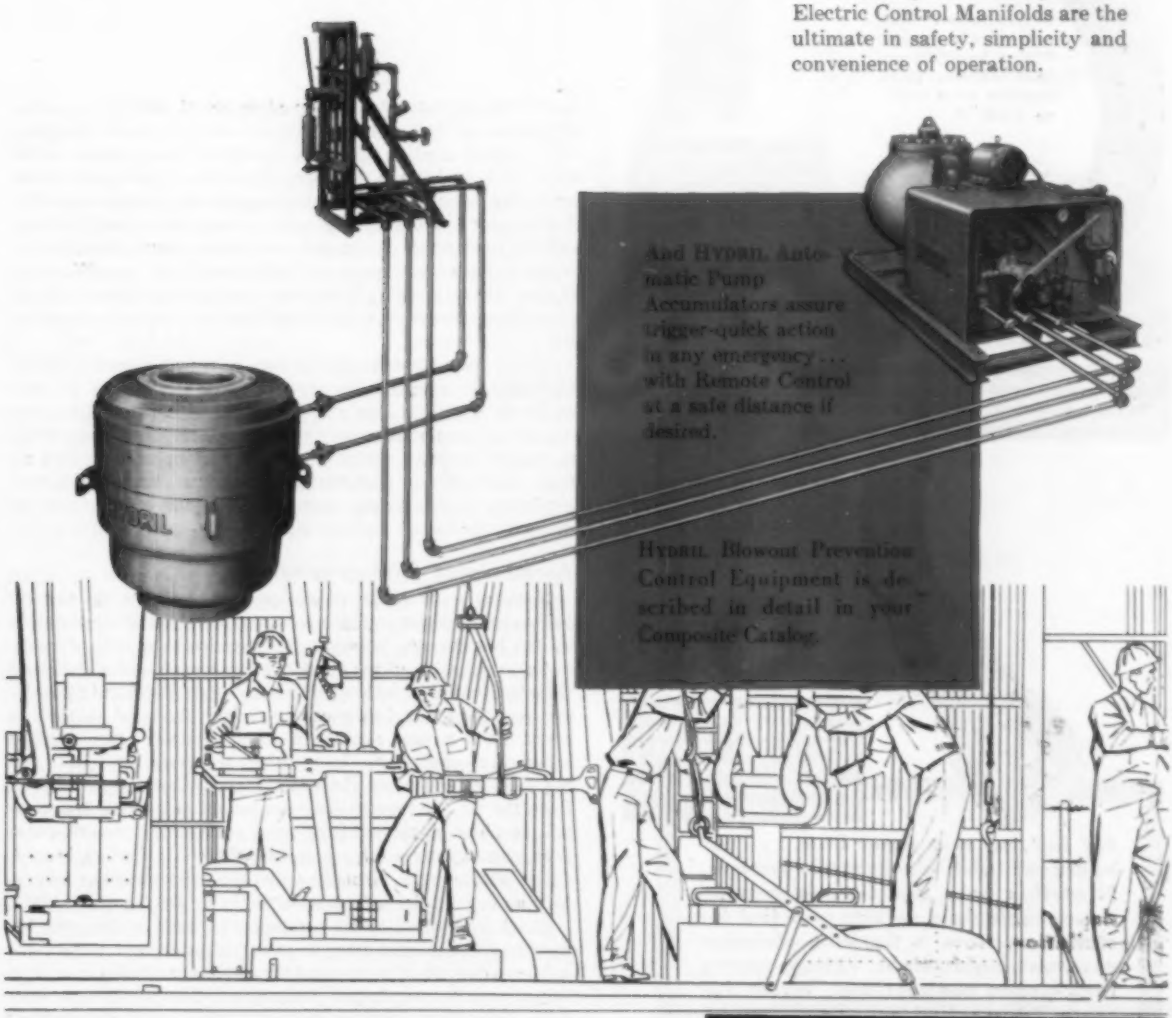
HYDRIL

TAKES THE "BLOW" OUT OF BLOWOUTS!

The HYDRIL System of Blowout Prevention Control provides faultless, foolproof control of threatening well pressures.

HYDRIL Blowout Preventers—Type "GK" or Type "MSP-2000"—are the most versatile of all blowout preventers.

HYDRIL Hydraulic or Hydraulic-Electric Control Manifolds are the ultimate in safety, simplicity and convenience of operation.


And HYDRIL Automatic Pump Accumulators assure trigger-quick action in any emergency... with Remote Control at a safe distance if desired.
HYDRIL Blowout Prevention Control Equipment is described in detail in your Composite Catalog.

HYDRIL COMPANY

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with STRATOFLEX HOSE & FITTINGS

SF 124 Teflon* Hose with SF 324 Swaged Fitting for extreme temperatures. Stays flexible from −65° to +450° F.

SF 211 Single Wire Braid Fabric Covered Hose with SF 319 Reusable Swivel Fitting for all-purpose industrial applications.

SF 212 Double Wire Braid Rubber Covered Hose with SF 320 Reusable Swivel Fitting for high pressure applications.

SF 225 Single Wire Braid Rubber Covered Hose with SF 326 Reusable Male Pipe Fitting for superior resistance to abrasion and corrosion.

For fuel, oil and water lines . . . for hydraulic and air control systems, Stratoflex hose and fittings provide dependable field service plus fast installation. Hose is flexible, abrasion resistant, lightweight. Fittings assure leak-proof connections. Write for more information.

*TEFLON is a registered DuPont trademark.

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Aerial Color Photos Aid Geological

COLOR photography employed in aerial surveys is saving thousands of dollars and manhours in geological mapping and pipeline studies. Changes in color tones, undetectable with black and white photography, denote geological characteristics which aid in pinpointing oil and mineral deposits. Subtle color shadings in large areas of rock or vegetation often aid the location of faults and also often reveal invisible deposits of minerals. Hycon Aerial Surveys, Inc., an affiliate of Hycon Manufacturing Company, recognized these facts in pioneering the use of aerial color photo survey operations in the United States.

Aerial color photography is also now being used to make high-altitude portraits of mountainous and jungle regions in South America. Bird's eye pictures of earth structure in remote mountainous regions are giving geologists direct clues to mineral deposits which would have taken years to find on foot. High-altitude photographic technique, using P-38 type airplanes, is also aiding map-makers in the tedious task of mapping the earth's surface accurately.

Aerial Color Photography

Nature's wide range of colors around the world usually carry some definite significance. Interpretation of these colors by the human eye, however, requires long periods of study to ferret out the various meanings attached to color shadings. Detailed studies of wide areas can be made first-hand by walking over the ground in question. Or fast-flying airplanes can cover much ground rapidly. But neither observation method is entirely satisfactory. In walking, the observer misses the big picture; and when the ground is covered too rapidly, as from the air, the human observer misses much significant detail. Mechanical recorders of color, such as the camera, however, can capture a large area of details in a fleeting instant. Color photographs virtually move the ground to the laboratory and make the information available for leisurely study.

Black and white aerial photographs, used in the past for mapping studies and mineral prospecting, do not convey the subtle variations of land structure which are so vital in analyzing an area for subsurface makeup and possible mineral content. Color transparencies, properly viewed with stereoscopic equipment, provide a reproduction of the photographed area which is very nearly an exact replica down to the last minute detail. Rock formations, vegetation, striations, depressions, and all other natural characteristics of the face of the globe stand out in three-dimensional clarity.

The film used is Eastman Ektachrome. The optimum hours during the middle of the day for photographing the earth's surface in color are less per day than for black and white photos. This is because of the difference in exposure latitude between black and white and color film. This added timing requirement, plus slightly higher film and processing

Color photography techniques now added to aerial survey methods. Recorded subtle color changes in rocks and vegetation help in mapping faults and other geological features

Mapping

costs, makes aerial color photography somewhat more expensive than black and white surveys. However, the slight increase in cost is offset manyfold by the scores of added features made possible with color photographs.

Color transparencies can be made into black and white prints of identical quality to conventional black and white prints which are familiar to map-makers and geologists. The emulsion characteristics of the color film available and used today are such that all the detail inherent in aerial photo techniques is usable in making black and white topographic maps from color photographs.

Color photos from the air cost roughly 40 percent more. However, many geologists, city engineers and prospectors, as well as forestry groups, are finding that the increased benefits of color more than offset the higher price. In particular, when the finished work is to be used for map making as well as photo interpretation, use of color increases the total cost only slightly. Meanwhile the color greatly enhances the photo-interpretation phase of the project.

Mosaics are also easy to accomplish with aerial color photos. A mosaic is a collection of overlapping aerial photos fitted together to form a large overall picture map. A mosaic is made by carefully joining many small photos together to form a larger master picture. This master picture is then reproduced in black and white in quantity. With color transparencies, the matter of making black and white prints is simply a matter of producing a black and white negative directly from the color positive transparency.

Advance techniques in aerial color photography are speeding the process of accurately mapping the world as well as aiding the geological fraternity. Aerial surveys by Hycon in such places as Bolivia and Peru have produced data rapidly which might otherwise have taken decades to accumulate by painstaking ground surveys. Inaccessible mountain regions, far from the reaches of modern civilization, were only yesterday almost completely unexplored from a geological standpoint. Today data are available to enable prospecting teams to pinpoint possible mineral and oil deposits.

On the Colorado Plateau, a recent color photogeologic study of about 2000 sq miles of the uranium producing areas indicated that there were subtle alterations of the rocks reflecting ore zones which were largely overlooked by ground studies. In the study of dozens of mineralized areas it has been found that there are essentially none which do not have changes of color in the surrounding rocks reflecting the ore zones. These changes in color were immediately apparent to the trained eye in color photographs. Black and white photography revealed only a portion of the color graduations, and even then the interpretation of the picture was much more difficult than with the color photos.

Hycon Aerial Surveys, Inc.

A NEW STANDARD OF DRILLING CONTROL for you with MARTIN-DECKER ELECTRIC TACHOMETERS

MORE EFFECTIVE MEASUREMENT OF ROTARY RPM, PUMP OUTPUT, AND ENGINE RPM

You will find these new tachometers the most accurate, versatile, and adaptable drilling aids you have ever used for the measurement of rotary-table speed, pump-stroke count, and engine RPM.

ELECTRIC — SELF-ENERGIZING

These instruments have their own generators that transmit low-voltage signals through electric cords to meters installed wherever you need them.

MULTIPLE METERING IS SIMPLE

Now you can have meters as far from the take-off points as you need. You can also have several meters getting their signals from a single source, or a grouping of several meters, each getting its signal from a different pump or engine—or you can have both. Additionally, you can have a simple recorder to make a permanent record of these operations.

CALIBRATE RIGHT ON THE RIG

You can move these instruments from rig to rig, with little concern about the gear ratios used. The pump-stroke tachometer and the rotary-table tachometer each has a screw adjustment that allows you to calibrate the instrument right on the rig. Thus, you don't have to stock different types of tachometers for different types of engines and different types of rotaries.

GET THE FACTS TODAY

Find out how the new design in tachometers can revolutionize the instrumentation on your rig. Write for free literature from the Martin-Decker Corporation, 3431 Cherry Avenue, Long Beach 7, California.

MARTIN-DECKER CORP.

HOME OF THE WEIGHT INDICATOR — LONG BEACH, CALIFORNIA

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD B-91

Here is a new full-revolving, stationary-mounted crane — the UNIT Mariner — specially designed for off-shore drilling operations. Conceived, developed and perfected by UNIT, the Mariner meets all requirements for cargo handling from a fixed mounting as applied to ships, barges or off-shore platforms. Unlike conventional cranes, the Mariner emphasizes unusual strength in turntable, roller path, rollers, hook shoes, boom and hoist mechanism.

A special, heavy-duty "A" frame permits capacity loads with extended boom at long radius. The famous UNIT sealed cast gear case serves as a protection against salt spray.

SAFETY is a major feature. Incorporated in the Mariner design, are positive and mechanical boom stops. These boom stops control the angle of elevation and prevent the boom from whipping back. Also the safety-promoting Full Vision Cab enables the operator to see what he is doing at all times. Load ratings are based on high factors of safety.

Yes, the Mariner is designed primarily for your type of cargo handling. Get the facts. Send for bulletin — NOW.

UNIT CRANE & SHOVEL CORP.

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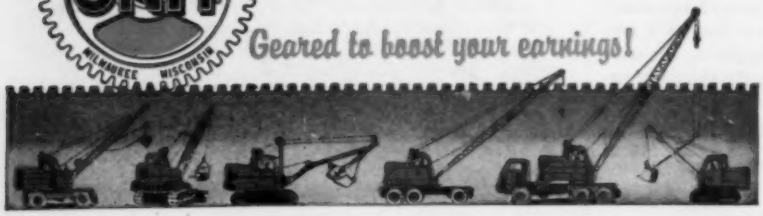
UNIT CRANE & SHOVEL CORP. MILWAUKEE WISCONSIN

Geared to boost your earnings!



New Diesel Pile Hammers

235 A new bulletin, recently made available by the McKiernan-Terry Corporation, describes their Models De-20 and De-30 diesel pile hammers. Also contained in Bulletin 67R is the complete line of universal drive caps, developed specifically for use with the new McKiernan-Terry diesel pile hammers.

Bulletin 67R will prove extremely valuable to anyone presently using or contemplating the use of a diesel hammer. Contents include details of the operational features, such as mobility, time-saving, low operating costs and minimum maintenance. The complete cycle of operation is described thoroughly, as are design features, and complete technical specifications for both models. For the man in the field, the bulletin contains a chart graphing the solution of The Engineering News formula to determine the static load bearing capacity for both sizes of the hammer when delivering observed blows per inch with observed ram-piston stroke. McKiernan-Terry Diesel pile hammers are fitted with a permanent, graduated scale for measuring ram-piston stroke.

Pile Hammer Division, McKiernan-Terry Corp.

Electric Chain Hoist

236 A comprehensive and information-packed bulletin, describing the manufacturer's new electric chain hoist which is available in two types of reeving: Single chain 300 to 2000 lb capacity model and the double chain 3000 to 4000 lb capacity model, has been prepared and issued by the Wright Hoist Division, American Chain & Cable Company, Inc.

Designated as Bulletin DH-73, this 4-page folder presents valuable data on construction details, weights, capacities, lifting speeds, dimensions and other general information of interest to plant management and engineers alike.

American Chain & Cable Company, Inc.

Transducers

237 New 12 page illustrated manual "Instructions for the Application of Piezoelectric Transducers" has been released by Endevco Corp. General applications of these transducers are covered using charts and curves to indicate characteristics and limitations. Topics covered include high frequency response, basic design, low frequency response and qualities desirable in associated instrumentation.

Endevco Corporation

Rigid Plastic Pipe Catalog

238 A new, 16-page technical catalog entitled "Triangle Rigid High Impact Plastic Pipe and Fittings" has been released and is available from Plastic Pipe Division, Triangle Conduit and Cable Company, Inc.

In describing Triangle RHI Pipe, which has a wide application in the industrial and processing field, the catalog covers such subjects as applications, chemical resistance ratings, electrical properties, physical properties, working pressures, and pressure drop. An extensive fittings section is included, as is one on installation and handling.
Triangle Conduit & Cable Company, Inc.

Catalog Featuring Trailers

239 In response to widespread interest for information on the mobile trailer units for industrial needs, the Industrial Division of Spartan Aircraft Company has published a complete catalog on its models.

Including details of famous Spartan construction methods, the brochure also contains floor plans and descriptions of 17 specially-designed layouts that are now assembly-line produced for every type of field housing need. These floor plans were developed from research and analysis of field needs and customer requests. Pictured also are some of the many ways such units are being used by major companies in operations around the world. Spartan industrials, for instance, include units for testing laboratories, offices, display combinations, kitchens, diners, bunk houses, first aid stations, machine shops, laundries, power plants, and a variety of others.

This 20-page, 2-color catalog . . . plus any information desired on special designs to fit particular requirements . . . is free on request.
Spartan Aircraft Company, Industrial Division

Liquid Lock Washer

240 Technical Report No. 5 gives complete information on how to lock threaded fasteners with Loctite Sealant. Proper selection of grade is outlined in simple terminology so that user can easily obtain predictable results to meet specific locking torque requirements. Specific uses and methods of application are documented for studs, screws, nuts, and other threaded products. Also information on techniques for sealing and soldering sleeve joints.

Fundamental data are given on the basic principles of thread-locking with plastics, as well as formulas for torque determination under varying conditions. Physical properties of the material, both in the liquid and solid state are given, including: Cure time, resistance to solvents and chemicals, heat aging, hot strength, resistance to thermal shock, and electrical properties.
American Sealants Company

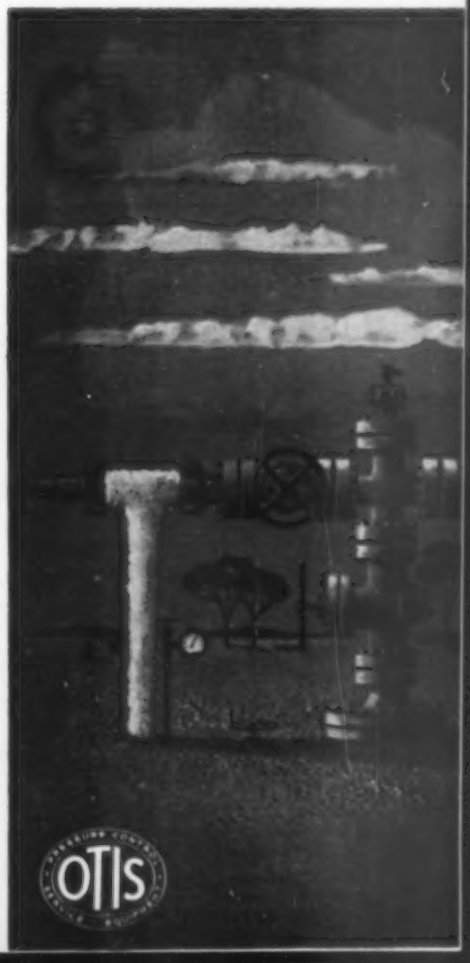
On Gas Lift Valves

241 Otis Pressure Control, Inc., has published a new 6-page bulletin on its line of Type C gas lift valves. Literature contains full-color illustrations, including cutaway sections of the equipment, flow courses, etc.

According to the literature, the valve is remarkably simple in design and construction. The only moving parts in the valve are two resilient elements. The valve can be used for either continuous or intermittent flow, it can be used in dual-completions, and it is easily adapted to casing flow. Unit is built around a full-opening mandrel rather than alongside a pup joint and operates completely by casing pressure, independent of tubing pressure.

Valve is concentric with the tubing string and does not have any offsets nor unusual shapes. The equipment is available in a full range of sizes from ¾ by 1¾ in. to 2½ by 4 in.
Otis Pressure Control, Inc.

Warm Up Flow Line Freeze Ups...
Eliminate Surface Heaters...Reduce
Pressures to Safe,
Workable Limits With OTIS
BOTTOM-HOLE
REGULATORS
OTIS / Branches Throughout the Oil Country



Technical Bulletin on Oil Coolers

242 Bulletin 12C, "Type 'BD' Oil Coolers," just published by Schutte and Koerting Company, describes a complete line of oil coolers used for cooling fluids in lubricating, power and processing applications.

Both single and 2-pass coolers (conforming to ASME Code requirements for Unfired Pressure Vessels) are described. The bulletin includes data on design and operating features, material specifications, sizes and dimensions, plus a handy sizing system. A nomograph for determining logarithmic mean temperature difference, together with simplified design equations, permits rapid approximation of unit for a specific application. A step-by-step example clearly illustrates the procedure.

Schutte and Koerting Company

Repowering

243 New life for old machines is the subject of a new booklet, "Repowering Made Easy," recently released by Caterpillar Tractor Co.

Many old machines thought to be at life's end because power is down can be made productive again by repowering with a specially designed engine package, according to the booklet. "Repowering Made Easy" describes through illustrations and successful installations how Caterpillar diesel engines help raise production on old machines. Also listed are some of the optional equipment and factory service available for repowering.

Caterpillar Tractor Company

Data Processing

244 A new series of illustrated brochures, detailing individual business applications of the Datatron electronic data processing system, is announced by the ElectroData Division of Burroughs Corporation. Brochures document specific Datatron solutions to computational problems in payroll processing, invoice billing, parts inventory controlling, accounts payable processing, utility billing, and life insurance recording.

Brief summaries of the brochures available now from ElectroData are:

Payroll. This 12-page brochure, No. 4-05-020, considers a 10,000-man company payroll in a step-by-step description of the Datatron processing method. System component details are given, including the use of Datafile and Cardatron units.

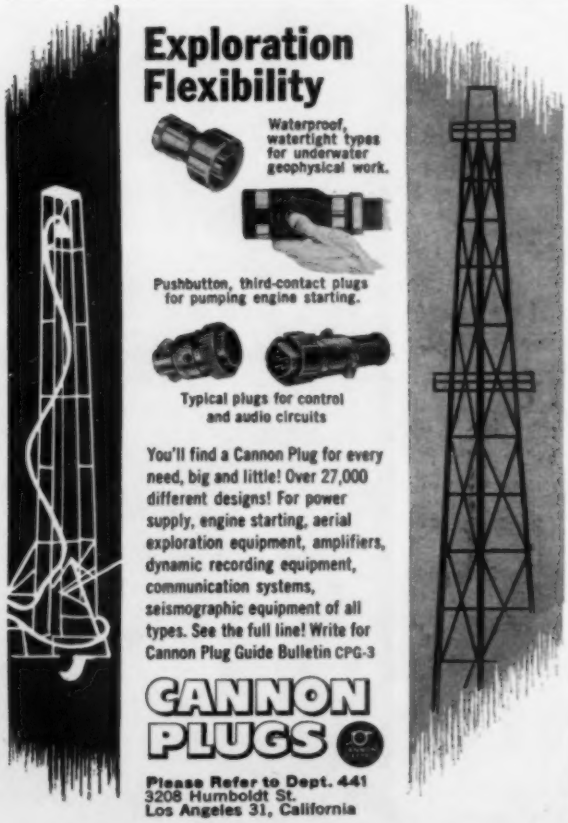
Invoice Billing. Brochure No. 4-05-010 describes in four pages the use of Datatron by a wholesale merchandising concern with an inventory of 15,000 items with which to supply 90,000 customers. The system's simplicity of operation and wide range of commands are outlined in the application.

Parts Inventory Control. Brochure No. 5-01-110, four pages, has as its problem a manufacturer who must decide how many of each of his 1000 products should be assembled to meet scheduled delivery dates and maintain an adequate parts supply. The inventory updating procedure possible with Datatron is explained.

Accounts Payable. The 8-page brochure, No. 4-05-030, explains how scattered clerical procedures can be reduced to an automatic routine through the use of Datatron. High-speed computations, automatic file maintenance, and immediate printed results speed the accounts payable process.

Utility Billing. This brochure, No. 4-04-020, describes in 8 pages the Datatron billing procedure by a utility supplying electrical power to 300,000 customers in 50 districts. The Cardatron, high-speed photoelectric reader, addressable magnetic tape, and large 4080-word storage make the Datatron system especially adaptable in handling utility accounting.

ElectroData Division, Burroughs Corporation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You'll find a Cannon Plug for every need, big and little! Over 27,000 different designs! For power supply, engine starting, aerial exploration equipment, amplifiers, dynamic recording equipment, communication systems, seismographic equipment of all types. See the full line! Write for Cannon Plug Guide Bulletin CPG-3
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Los Angeles 31, California

Why Not Just Tell Them?

245 As an aid to their own technical writers Minneapolis-Honeywell Regulator Company has published a booklet entitled "Why Not Just Tell Them?" which provides many helpful hints in the art of writing. They have now made this booklet available to members of the petroleum industry.

In just 25 short pages, this booklet delivers the keys to good writing and puts this to practical use in down to earth illustrations and examples. Phrased as "the 10 commandments for technical writers" it is an excellent guide to the man in the field as well as a good reminder for those experienced in report writing. In addition, a list of abbreviations and common engineering multiple words are included for better handling of technical terms.

Minneapolis-Honeywell Regulator Company

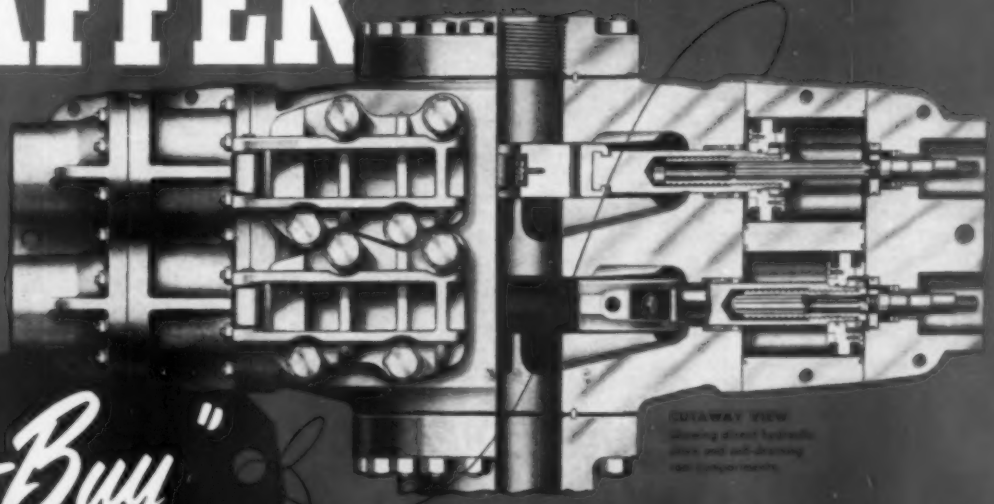
Increasing Oil Production

246 Increased oil production through use of effective corrosion inhibitors at low concentration cost is discussed in detail in a newly published booklet prepared by the Chemical Division of Armour and Company. Called "Armour Organics for Increased Oil Production," booklet covers the application of polar cationic chemicals in both primary and secondary oil production.

Relationship between corrosion and micro-organisms is explained and the chain reaction caused by sulfate reducers is reviewed. This points up a need for a corrosion inhibitor that is also a bactericide and is effective under variable conditions. Illustrated booklet reports results of actual field tests. Other chapters cover bactericides and algaecides, description of recommended chemicals, and case histories.

Armour and Company, Chemical Division

SHAFFER



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In the final analysis, when you invest in Cellar Control Gates what do you expect for your pressure control dollar? You want SAFETY... you want COMPACTNESS... you want CONVENIENCE... and you want ADVANCED DESIGN that assures sustained efficiency and maximum all-around performance. Right?

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They're SAFE

Backed by over three decades of pressure control leadership. Shaffer equipment is *quality* equipment, built throughout to the highest standard of safety, long life and low maintenance. It is the choice of leading operators throughout the oil world.

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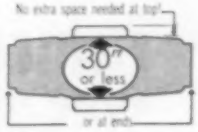
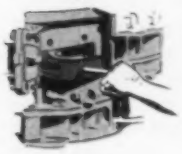


Even in sizes as large as 13⅝" (12" Series 900) Shaffer Hydraulic *Double* Gates (*two* ram compartments unitized into *one* compact body) require only 30" total height.

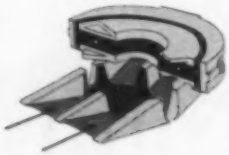
Width and length dimensions are also unusually compact... and no extra space is needed at the ends and top for ram changes!

They're CONVENIENT



Rams are changed through patented side-opening doors. And closing the doors automatically aligns the rams within the Gate. There's no need to dismantle the Gate to change rams—nor need extra space be provided above the Gate or at the ends in order to make ram changes!

They're SELF-DRAINING



Only Shaffer Gates provide *Self*-Draining Compartment Bottoms with rams traveling on high guide ribs where no detrimental sand or mud accumulates—another Shaffer feature that means better, *safer* performance whenever fast action is needed!

And They Have Many Other Advanced Features such as *Direct Hydraulic Drive* (no yokes or complicated secondary connections between pistons and rams)... choice of *Rising* or *Non-Rising* Locking Shafts (the former for quicker indication of ram position, the latter for greater operating compactness)... *Completely Enclosed Design*... and many other advantages.

GET THE FACTS. Before you buy ANY cellar control gate equipment, let your Shaffer representative give you the complete story on Shaffer's years-ahead design. You'll rate them "Best Buy," too!

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EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U. S. A.

34 years OF OIL TOOL LEADERSHIP

Pneumatic Control Theory

397 A new bulletin on pneumatic control instruments, featuring more than 10 pages of general automatic control theory has been published by The Bristol Company. The 44-page, 2-color bulletin describes in simplified terms and illustrations the basic concepts of narrow band, proportional, reset, derivative, and reset plus derivative control actions. Also covered are selective control, cascade control, and ratio control.

Completing the bulletin are descriptions of the features of the company's line of Series 500 pneumatic recording and indicating controllers. Also included is complete information on sensing elements used with the instruments, for measuring and controlling such variables as temperature, pressure, humidity, flow, density and specific gravity, liquid level, and pH. Final control elements and accessories are listed.
The Bristol Company

Spring Selector

247 A Selector Guide for nickel alloy spring wire is available from Techalloy Company, Inc. Publication discusses five methods of heat treatment of nickel alloys and the processing of springs: Stress equalizing, stress relieving for uniform moduli, soft annealing, age hardening and solution annealing.

Selector Guide also shows the recommended thermal treatments for nickel alloy springs. In chart form 13 nickel alloy springs are listed from the specific values of temperature and time for stress equalizing and age hardening where these operations are recommended or possible.

Manufacturers in the spring, electronic, electrical, aircraft, guided missile, nut, bolt and fastener fields as well as purchasing agents and product design engineers will find Selector Guide a comprehensive review. It makes easier the choice of the proper alloy and the proper treatment for suggested applications.
Techalloy Company, Inc.

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For Gas Lift Equipment, Wire Line Service, and Wire Line Tools, call your nearest Camco representative. **Ten years of improvement — Ten years of progress and development —**

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V-Belts

248 A new manual containing engineering data on V-belt drives for oilfield drilling rigs has been issued by the Goodyear Tire and Rubber Co.

Basic information necessary for proper design of slush pump, compound and drawworks V-belt drives and realistic horsepower ratings for primary drives of drilling equipment are outlined in the 16-page brochure.

Horsepower ratings in the brochure are compatible with horsepower being transmitted on actual drives. Ratings are based on severe service conditions.
Goodyear Tire and Rubber Company

Corrosion-Resistant Alloys

249 A new 104-page edition of "Hastelloy Corrosion-Resistant Alloys" is now available. The booklet gives up-to-date information on the 4 nickel-base alloys — Hastelloy alloys B, C, D, and F. Booklet describes chemical compositions, physical, mechanical, and high-temperature properties of the alloys. Also included is a table of the comparative resistance of the Hastelloy alloys to over 250 corrosives commonly handled in the chemical, petroleum, and metalworking industries.

More complete laboratory penetration data are included for some of the common corrosives such as hydrochloric, sulfuric, nitric, phosphoric, acetic, and formic acids. These data are supplemented with graphs showing penetration rates at various acid concentrations and temperatures.
Haynes Stellite Company, Division of Union Carbide Corporation

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EXPORT REPRESENTATIVE: New York 36, N. Y., 500 Fifth Ave., BRyant 9-2236

Perforating

398 "Precision perforating with Birdwell Selecto-Jets," a 4-page bulletin (No. 6166) on a new type of expendable perforator for well casing, is announced by Birdwell, Inc. The performance, design, and methods of using these encapsulated, shaped charges in conjunction with integral gamma ray detector are illustrated.

Birdwell, Inc.

Battery Connector Catalog

399 A new 32-page catalog, GB6, contains information on battery connectors, power connectors, and heavy duty connectors for industrial and allied applications.

Battery connectors are used in a variety of ways, to connect or disconnect power circuits, and to simplify the removal or installation of battery units. They are sturdy and rugged with ample insulation and high quality to withstand extremely rugged field service usually associated with these connectors. Heavy duty connectors are also described for connection and disconnection of circuits feeding industrial machinery, in motion picture and sound equipment, and in many other applications where a heavy duty connector is required.

Cannon Electric Company

Anchors and Anchoring

400 In the 2½ years since its first edition rolled off the presses, more than 100,000 "Anchors and Anchoring" have been distributed free —and the demand constantly increases rather than slackens. Written by R. D. Ogg, president of Danforth Anchors, and R. S. Danforth, founder and inventor, the 16-page, 2-color booklet presents a comprehensive survey of anchor history, testing, problems and recommendations.

The difficult feat of writing for both the layman and the expert has been accomplished in "Anchors and Anchoring." Its style is such that a newcomer to boating can understand it and yet the facts and figures are also presented and verified in such a manner that the most exacting expert is satisfied. Since its first appearance Danforth Anchors has made the book available free of charge to anyone requesting it. U. S. Power Squadrons and U. S. Coast Guard Auxiliaries have been among the most enthusiastic users, often using it as a supplementary text book.

Revisions, incorporating the latest information and data, have been made in each printing and will continue to be made in the future, thus insuring that no portion of the book becomes obsolete.

Danforth Anchors

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The best blowout preventer won't work if your operating unit fails. Payne Blowout Preventer Operating Units have no equal for reliability and economy. Rugged, fast-acting Payne Pumps keep pressures up where they belong. New 2,000 psi service pressure Non-Separator Type Payne Accumulators have no *bladders* or *diaphragms* to cause expensive shut downs. They are assembled in multiple units for any required volume. Consider every angle in choosing your blowout preventer operating units – reliability first, availability, maintenance and, of course, economy. Payne units are doing a better, more economical job on preventer hook-ups throughout the oil areas of the free world.

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Martin Cages last much longer. The oil-proof rubber guides do the trick, by absorbing the ball peen hammer action of the hard balls. They also have superior resistance to sand abrasion. And they can be replaced.

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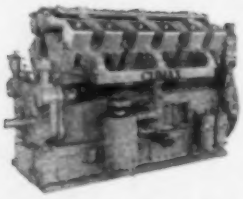
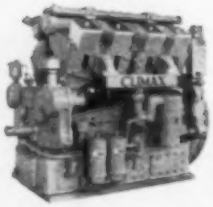


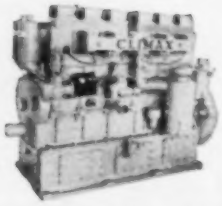
V-125—12 cylinder, 605 max. H.P. at 1200 R.P.M.

V-122—12 cylinder, 520 max. H.P. at 1200 R.P.M.



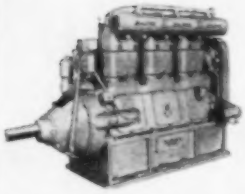
V-85—8 cylinder, 390 max. H.P. at 1200 R.P.M.

V-80—8 cylinder, 340 max. H.P. at 1200 R.P.M.



K-75—6 cylinder, 302 max. H.P. at 1200 R.P.M.

K-67—6 cylinder, 265 max. H.P. at 1200 R.P.M.



R-165—6 cylinder, 192 max. H.P. at 1200 R.P.M.

R-110—4 cylinder, 130 max. H.P. at 1200 R.P.M.

Climax Oil Field engines are well known for their rugged construction and "ability to take it" under any operating condition. These engines are made of the finest metal alloys and castings available . . . manufactured to precision standards. All models have a 7" stroke—resulting in low piston speeds . . . minimum wear . . . low maintenance . . . and long engine life.

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Type CT — For damp or corrosive locations where a moderate degree of mechanical protection to the tube is required. It employs a corrosion-resistant thermoplastic sheath, resistant to water, acids, alkalies, oil, and is flame-retardant.

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Type CAT — For protection against corrosion to the armor and to the tubing.

Type CTAT – Combining the advantages of Types CTA and CAT, the fourth type illustrated has the polyvinyl chloride thermoplastic sheath both under the armor and over the armor, thus providing maximum mechanical and corrosion protection.

Available in long runs from 2 to 37 tubes of copper, aluminum and polyethylene tubing in sizes ¼" O.D. This product is licensed under U. S. Patent No. 2,578,280.

Plastic Coated Single Tubes, copper or aluminum, should be used to give corrosion protection to all single lines up to the final tube fitting, where trouble from corrosion may occur.

Send for Bulletin No. 356-L

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the accurate oil and water volume meter

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Specifications are for 125 psi W. P. CV and FV units. Information on other W. P. models available on request.

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Field-engineered to make continuous, trouble-free operation, calibration and maintenance as easy as possible, the VOL-U-METER gives dependable, accurate performance at the lowest possible cost. **Maintenance cost per unit averages less than $10.00 per year!** Operating methods are quickly and easily understood. For dependable, accurate metering units, specify VOL-U-METERS. Available with pneumatic or electrical controls.

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MODEL NUMBERS	2½ CV 01	2½ FV 01	6 CV 01	6 FV 01	10 CV 01	10 FV 01	20 CV 01	20 FV 01	50 CV 01	50 FV 01	100 CV 01	100 FV 01
Volume per Dump, Bbl.	⅛	⅛	⅛	⅛	1.0	1.0	2.0	2.0	5.0	5.0	10	10
Rated Metering Capacity, BPD	300	300	600	600	720	720	1440	1440	2000	2000	4000	4000
Avg. Expected Metering Accuracy, Percent	99.01	99.80	99.22	99.90	99.44	99.96	99.56	99.97	99.75	99.98	99.87	99.98
A Shell and Base O.D., Inches	16"	19"	20"	24"	24"	24"	30"	30"	36"	36"	42"	42"
B Length of Dump, Inches	12.62"	17½"	16.06"	20½"	22.20"	31½"	28.20"	38¾"	49.00"	60½"	56.00"	68"
C Overall Height, Inches, Approx.	38¾"	48"	43⅞"	63⅞"	51½"	64½"	63⅞"	76"	88¾"	98"	102"	110"
D Center Line Height of Valves and Center Line of Unit to Face of Inlet & Outlet Valves, Inches, Approx.	6"	6"	7"	7"	7"	7"	8"	8"	8"	8"	10"	10"
F Size of Inlet & Outlet Valves, Inches (Standard)	1"	1"	1½"	1½"	1½"	1½"	2"	2"	3"	3"	4"	4"
G Gas Equal. Conn., Inches	1"	1"	2"	2"	2"	2"	3"	3"	3"	3"	4"	4"
H Height of Upper Liquid Level, Inches	28"	35 1/16"	34⅛"	40 3/16"	41¾"	82"	81¾"	82 1/32"	74½"	85¾"	86⅞"	94¾"

OIL METERING and Processing EQUIPMENT CORP.
MELROSE 5-1226 • 4843 YALE STREET
HOUSTON 18, TEXAS

WICKWIRE ROPE

THE COLORADO FUEL AND IRON CORPORATION — Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION — Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane • WICKIWRE SPENCER STEEL DIVISION — Boston • Buffalo
Chattanooga • Chicago • Detroit • Emleton (Pa.) • New Orleans • New York • Philadelphia

ROTARY DRILLING LINES

6 x 19 Seale Construction • "Wisscolay" Preformed
6 strands—19 wires to the strand—1 fiber core or 1 Independent Wire Rope Core (IWRC)

Wickwire's 6 x 19 Seale construction with either fiber or IWRC core has proved its ability to give excellent rotary drilling line service when operating under severe conditions such as low safety factors, fast acceleration and overwinding in multiple layers on the drum.

These ropes are supplied "Wisscolay" Preformed to provide better bending life over multiple reeving through the blocks. Further, the rope's relaxed condition reduces whipping and allows more uniform winding on the drum.

The IWRC construction should be used if the line is subjected to crushing on the drum because of a low safety factor. This construction, as used by Wickwire, gives each strand the best support over the entire life of the rope . . . provides maximum core support with a minimum of strand-to-core nicking. In addition, this Wickwire construction has the proper shape to resist severe crushing and heavy peening because it uniformly transmits the crushing forces to the very center of each strand; this allows the individual wires to resist displacement which occurs in some other constructions.

NOTE: We recommend that rotary lines be purchased in longer lengths than are required to string up the blocks for the maximum number of lines used. This permits the line to be cut off at the drum end and moved forward; as a result, wear and fatigue are more uniformly distributed over the entire line and deterioration of the line due to concentrated wear or fatigue at one point is prevented.

Diam. in Inches	Approx. Circum. in In.	Approximate Weight Per Ft. in Lbs.		Breaking Strength in Tons of 2000 Lbs.	
		Fiber Core	Independent Wire Rope Core	Fiber Core	Ind. Wire Rope Core
Gray Strand Or Improved Plow Steel					
1½	4¾	3.60	3.96	92.0	98.9
1⅜	4⅜	3.03	3.33	77.7	83.5
1¼	3⅞	2.50	2.75	64.6	69.4
1⅛	3½	2.03	2.23	52.6	56.5
1	3⅛	1.60	1.76	41.8	44.9
⅞	2¾	1.23	1.35	32.2	34.6
¾	2⅜	.90	.99	23.8	25.6
⅝	2	.63	.69	16.7	17.9
Plow Steel					
1½	4¾	3.60	3.96	80.0	86.0
1⅜	4⅜	3.03	3.33	67.5	72.6
1¼	3⅞	2.50	2.75	56.2	60.4
1⅛	3½	2.03	2.23	45.7	49.1
1	3⅛	1.60	1.76	36.4	39.1
⅞	2¾	1.23	1.35	28.0	30.1
¾	2⅜	.90	.99	20.7	22.2
⅝	2	.63	.69	14.5	15.6

CABLE TOOL DRILLING LINES

6 x 21 Filler Wire Construction
6 strands—21 wires to the strand—1 fiber core

This construction gives superior service over the old 6 x 19 Warrington construction which was formerly used for this type of operation. Its superior service is largely due to the fact that only large wires are used in the outer layer of each strand while the Warrington construction alternated large and small wires in this layer.

Specific advantages gained through the use of the Filler Wire construction include:

1. Increased abrasion resistance with no sacrifice of fatigue resistance.
2. Increased resistance to crushing and flattening on the drum.
3. More uniform distribution of stresses.
4. Same initial cost.

Drilling lines of this construction are usually furnished Right Lay for Midcontinent Fields; Left Lay for Eastern, Rocky Mountain and California Fields. Can be supplied with a "Wisscote" galvanized coating for use in fields where corrosive conditions are present. Available in three grades—Gray Strand Improved Plow Steel, Plow Steel and Mild Plow Steel.

Diam. in Inches	Approx. Circum. in Inches	Approx. Weight Per Foot in Lbs.	Breaking Strength in Tons of 2000 Pounds		
			Gray Strand Improved Plow Steel	Plow Steel	Mild Plow Steel
1	3⅛	1.60	41.8	36.4	31.6
⅞	2¾	1.23	32.2	28.0	24.3
¾	2⅜	.90	23.8	20.7	18.0
⅝	2	.63	16.7	14.5	12.6

"WISSCOLASTIC" DRILLING LINE

6 x 16 Filler Wire (6 x 21 Filler Wire) Construction
6 strands—21 wires to the strand—1 fiber core

"Wisscolastic" drilling lines have the extra elasticity that's needed for shallow drilling. This elasticity reduces vibration and whipping and provides better absorption of shock loads. Further, "Wisscolastic" drilling lines are "pre-broken-in" at the factory . . . have good drilling qualities from the moment they are installed. Furnished Left Lay unless otherwise specified. Available in Plow Steel and Mild Plow Steel.

SAND AND CORING LINES

6 x 7 Construction
"Wisscolay" Preformed
6 strands—7 wires to the strand—1 fiber core

Sand and Coring Lines of the 6 x 7 construction are furnished in three grades—Gray Strand Improved Plow Steel, Plow Steel and Mild Plow Steel. The higher grades are recommended for deep holes. Available with special "Wisscote" galvanized finish to combat the effects of sour oil that is encountered in some fields.

TUBING, SUCKER ROD OR WINCH LINES

6 x 31 Seale Construction
"Wisscolay" Preformed
6 strands—31 wires to the strand—1 fiber core
or 1 Independent Wire Rope Core

For better winding and increased freedom from twisting tendencies, we recommend that the above be specified.

TORPEDO LINES

5 x 5 Construction **5 x 7 Construction**
"Wisscolay" Preformed
5 strands—5 wires to the strand
5 strands—7 wires to the strand

Available in Gray Strand Improved Plow Steel or Plow Steel with either bright or galvanized finish.

TUBING OR SUCKER ROD LINES

18 x 7 Non-Spinning or Non-Rotating Construction
"Wisscolay" Preformed
18 strands—7 wires to the strand—1 fiber core

This construction is designed so that a single part line can pick up an unguided load without causing the load to spin. In this construction, the 12 strands in the outer layer are twisted in the opposite direction to the 6 inner strands to counteract the rope's tendency to unlay under pressure. Available in Gray Strand Improved Plow Steel or Plow Steel.

TAPERED DRILLING LINES

In deep drilling operations, one of the biggest weights that the drilling line has to support is itself. This weight can be reduced considerably through the use of Wickwire Tapered Drilling Lines. Near the tool, these lines are large enough to safely support the tool, small enough to eliminate excessive weight; on the drum end, the cable size is increased to safely support the weight of *both* the cable and the tool.

To assure maximum service, every Wickwire Tapered Drilling Line is individually designed and manufactured to specific requirements. Details which should be furnished in requesting information on this item include: projected ultimate depth of the hole, the weight of the tools (including socket, jars, stem and bit), minimum rope diameter desired and the depth at which the line is to be installed.

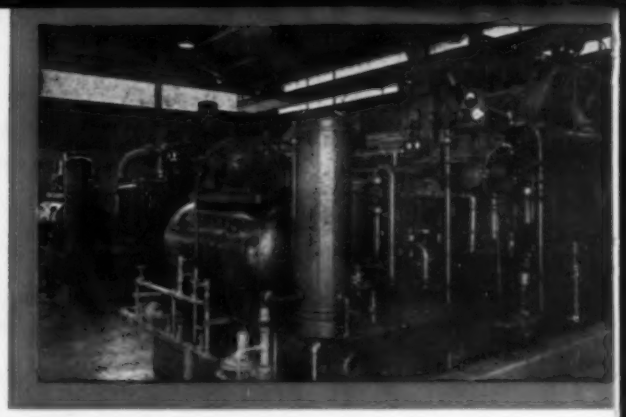
SOLID PLASTIC CORES

In the presence of corrosive fluids, or where continuous wet operation is encountered, a regular fiber core may quickly deteriorate.

A special *solid plastic* core has been compounded for use in Wickwire drilling lines, coring lines, swabbing lines, and baling lines. This core has been field proven to be superior to any other core under the adverse conditions mentioned. Furthermore, at high bottom hole temperature, when many cores become hard and brittle, this core continues to give many more hours of service.

Solid plastic cores are generally available in oil field ropes ranging in diameter from ⅜" through 1". Other sizes may be supplied upon request.

NOTE: Wickwire Preformed Wire Ropes can be supplied non-preformed upon request.

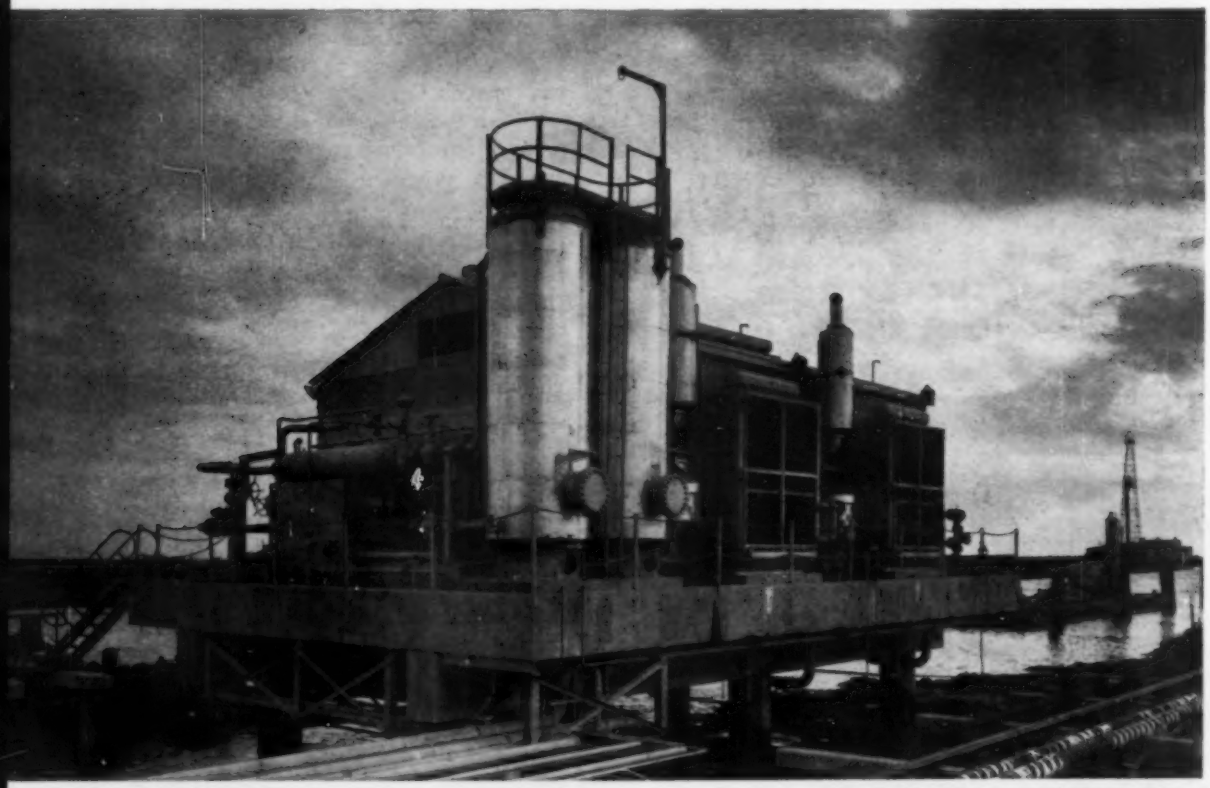


Southwest

PERFECT BALANCE FOR VIBRATION-FREE OPERATION

The perfect balance of these two Cooper-Bessemer GMXD-8 compressors and their packaged components allows them to compress 19 million cubic feet per day from 350 to 900 psi—vibration-free. Southwest Packaged Gas Compressors can be installed in any location to do any compressing job. They can be mounted on piling, pre-stressed concrete platforms, barges or wherever necessary for most economical installation and operation.

The unattended operation, possible with the automatic controls and safety devices on Southwest Packaged Compressor Plants, cuts operating costs per horsepower-hour to a fraction of the cost of a fully attended stationary installation. A Southwest engineer can show you actual comparative operating costs. Available in sizes from 265 h.p. to 660 h.p.



Shell Oil Company — South Pass, Louisiana

FOR GAS LIFT, GAS BOOSTER, PRESSURE MAINTENANCE AND SIMILAR PROJECTS.

SOUTHWEST INDUSTRIES, INC.

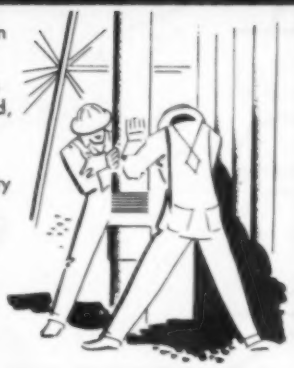
P. O. Box 19392, Houston 24, Texas

Two weighty advantages in J&L Casing:

1. — Informed service. Sales and follow-up by interested, enthusiastic men who know pipe and love it.

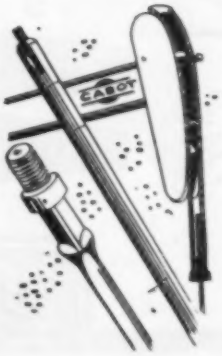
2. — No ordinary commodity as pipe goes; made under exacting mine-through-mill controls.

API seamless, all grades.



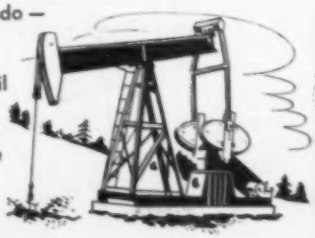
"JONES & LAUGHLIN SEAMLESS" on a length of tubing is more than product identification. It is assurance of exceptional quality, and a signed service guarantee from J&L Supply. Non-upset and external upset in all API grades, and J&L Integral Joint.

A real triumphant triumvirate in the oil fields of the United States and Canada; Axelson pump, Axelson rods, a Cabot unit! J&L Supply men have an important stake in these wells; owners rightly count them service partners.

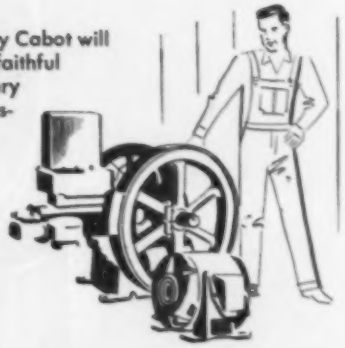


J&L shops make Axelson pumps a blue-chip investment. These shops tailor pumps to fit your wells — make misfits a thing of the past. Later, trained J&L men working with highly specialized equipment and complete parts inventories make worn pumps as good as new — literally. An oil field axiom: Never junk an Axelson; J&L can fix it.

A Cabot unit is, in principle, as simple and direct as a Stillson wrench. There's a job to do — let's do it! No electronic brains. No unnecessary parts. No beating the devil around the bush. No quarter asked, no vacations needed. Parts service just around the corner anywhere in the United States and Canada — at your J&L Supply store.



The horsehead on any Cabot will nod approval to the faithful teamwork of a Century Motor or a Fairbanks-Morse "ZC" engine. Weatherproof, foolproof power.



PRODUCERS' HORN OF PLENTY

Your J&L store stocks no hodge-podge of unstudied merchandise. If you need it, it's there — the very best of those thousand and one items required to carry on. J&L pipe for flow lines, J&L skid-mounted pump units, tubing heads, stuffing boxes, polished rods, packers, regulators, electric motors and controls, valves, fittings, packings, lubricants, tools, paints, parts!

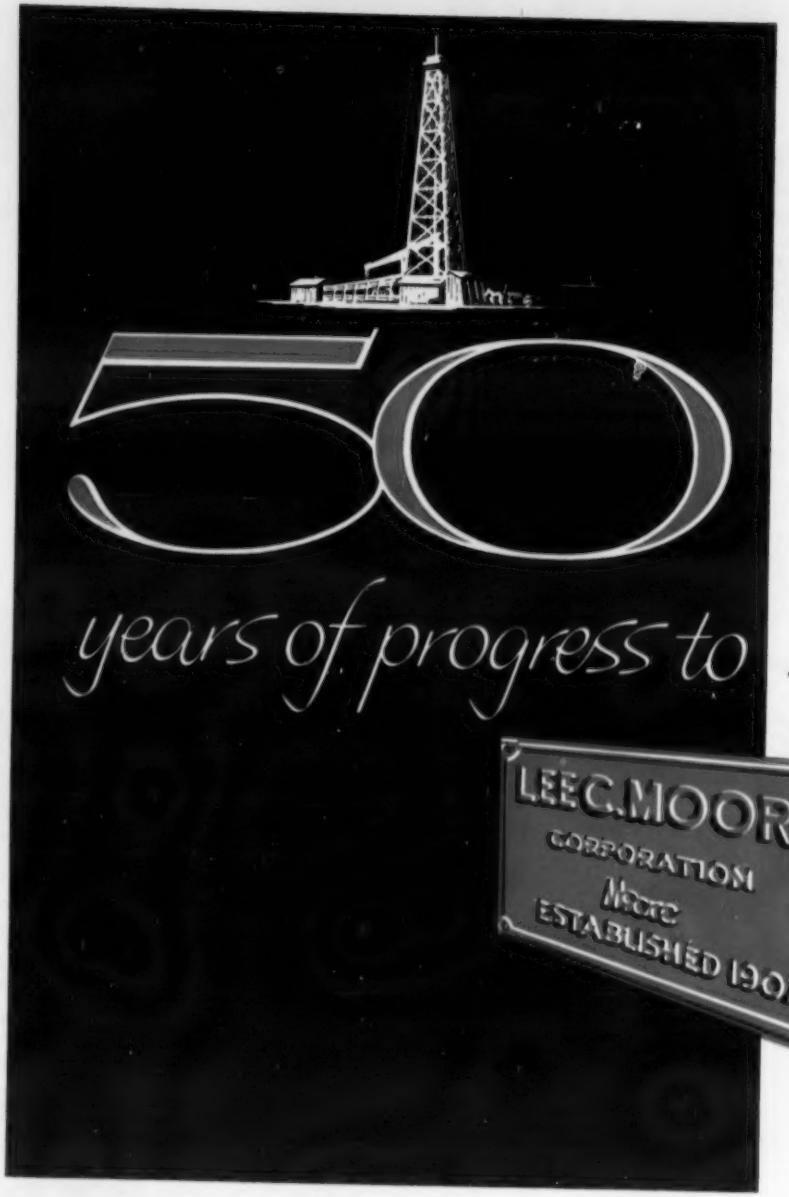
Jones & Laughlin

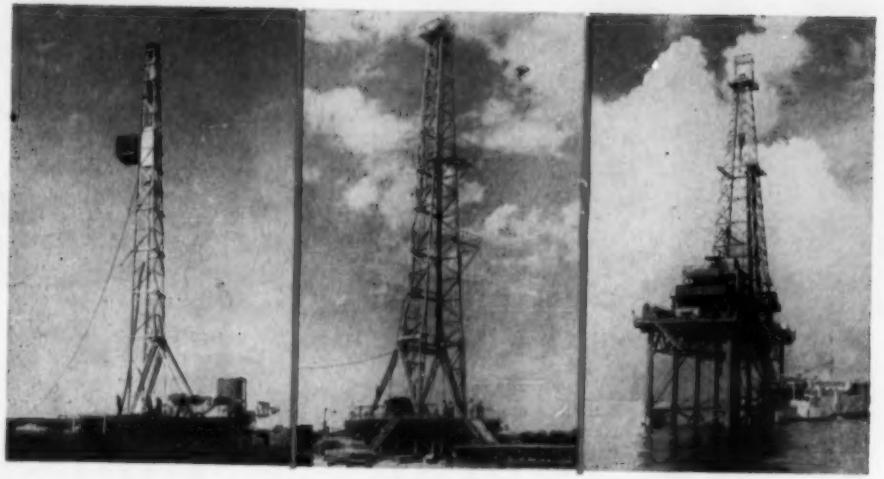
SUPPLY DIVISION — Tulsa

J&L — A GREAT NAME IN SUPPLIES

22

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD B-107





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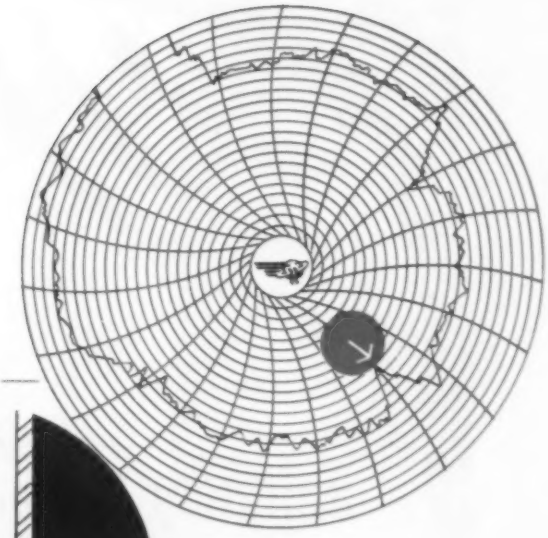
FOREIGN LICENSED MFR.: OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND

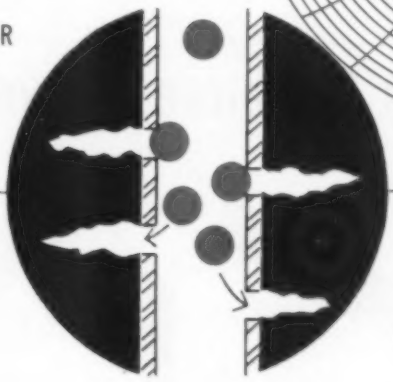
now... hydrodynamic programming!



ANOTHER HALLIBURTON SERVICE FOR

MULTIPLE FRACTURING

OF ONE OR MORE ZONES



CHOICE OF SEALING BALLS
RUBBER
NYLON
RUBBER COVER • NYLON CORE

It's effective, fast, economical

It's HALLIBURTON'S

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FRACTURING SERVICE

"Hydrodynamic programming" with Perfpac means a planned, controlled series of hydraulic fracturing operations... at different levels... in one or more zones through perforated casing... without packers or bridging material.

PERFPAC IS MORE ECONOMICAL

- Reduces need of packers and bridging plugs.
- Minimizes cost of drill-out operations.
- Saves cost of material.

PERFPAC IS VERSATILE... CAN BE USED

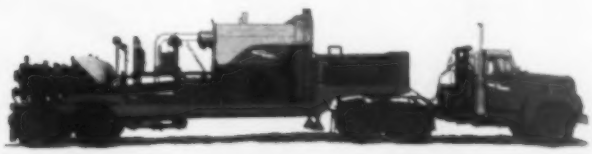
- In all types of formations.
- Through tubing, annulus or casing.
- For all types of perforations, jet or bullet.
- With all types of fracturing or treating fluids.

Save time, tools and treating cost... Try Halliburton's new Perfpac Fracturing Service.

HALLIBURTON

OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

PIONEERS IN FRACTURING SERVICES



251 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

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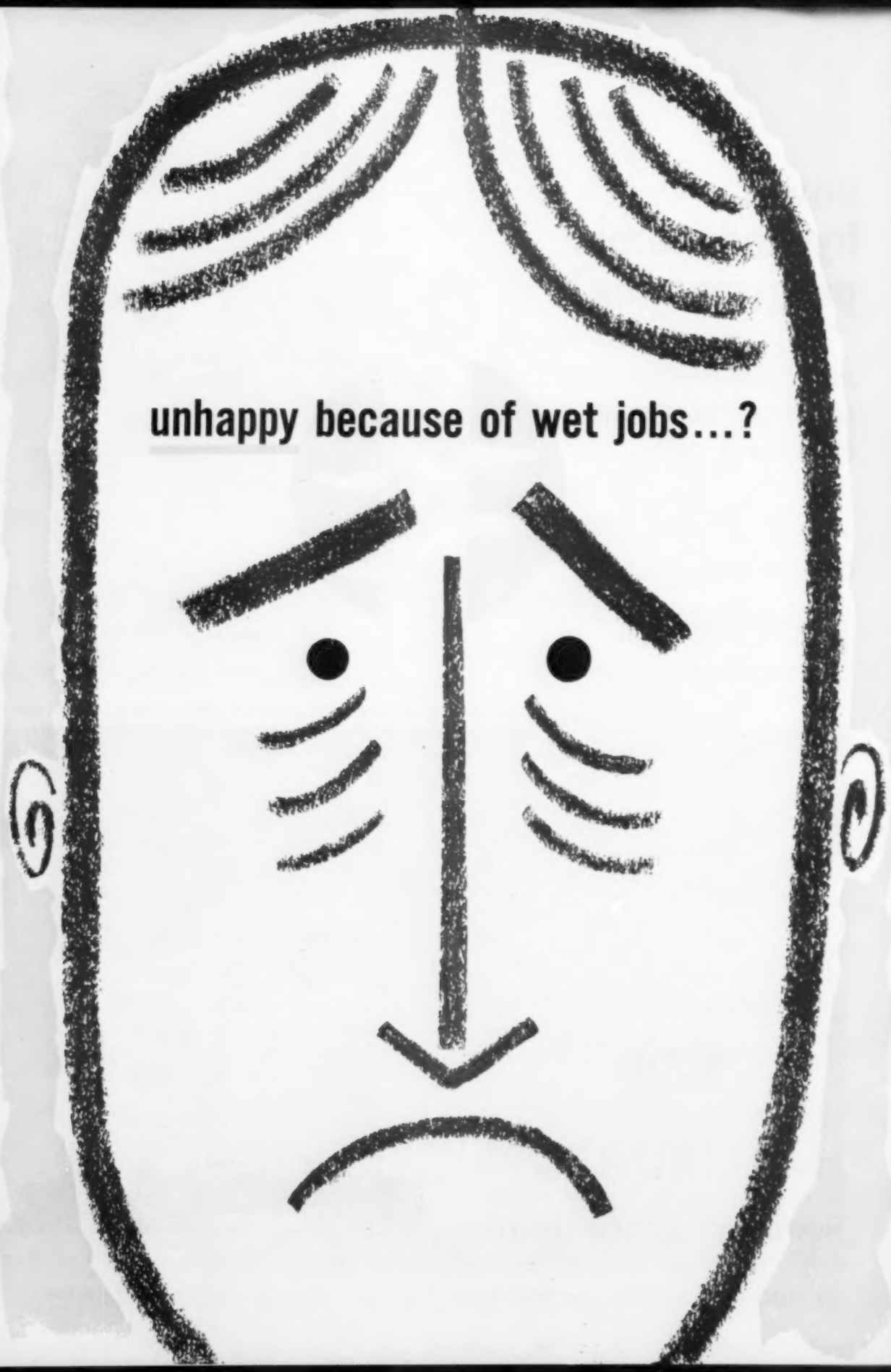
unhappy because of wet jobs...?

to avoid wet jobs

specify

MODEL 63

oilmaster

BOTTOM DISCHARGE VALVES

Wet jobs are caused by a pump that is stuck so tightly in the tubing string that it cannot be unseated with the sucker rods. The sticking is most commonly caused by sand settling around the pump barrel above the hold-down. The worst hazard occurs in a stationary barrel bottom anchor pump, where the sand can fill in all the way to the top of the pump.

It has long been known that a bottom discharge valve would keep the area between the pump and tubing free of sand by discharging a portion of the produced fluid at the hold-down. As long as the upward velocity of the fluid exceeds the settling rate of the sand, the annulus remains clean.

Prior to the introduction of the Oilmaster Model 63, bottom discharge valves have not been as dependable a unit as the other components of the pump. Still, they were in common use by operators who preferred to pull a pump prematurely if necessary, rather than risk pulling a string wet.

The Model 63 represents an entirely new approach to the pump valve design problem, and has overcome the weaknesses that previously existed. Numerous improvements have been made that can best be appreciated by a demonstration. Call your Oilmaster representative and ask him to bring out a Model 63 on his next call, or better, ask him to insure you against wet jobs by having him install them on all your stationary barrel bottom anchor or Multiple Tube Fluid Packed Pumps. Try them on long stroke pumps too, to eliminate the need of a top seal element.

FLUID PACKED PUMP CO.

Main Office and Plant, Los Nietos, California

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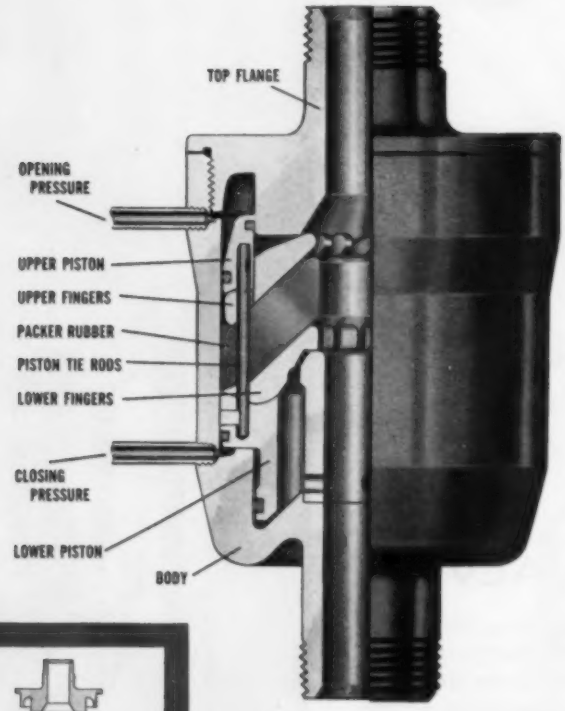
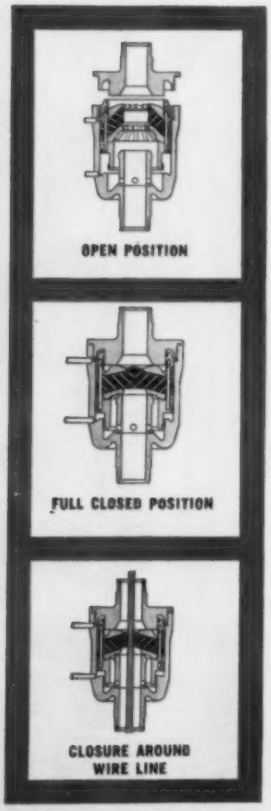
oilmaster PUMPS
FOREMOST IN THE INDUSTRY

SERVICE HIGH PRESSURE WELLS *Safely!*





THE NEW REGAN CONICAL WIRE LINE BLOWOUT PREVENTER

ASSURES COMPLETE CONTROL OF OIL WELLS AT ANY PRESSURE

These outstanding features make this new Wire Line Blowout Preventer the safest, easiest to use servicing device in the field:

- **TESTED TO 10,000 LB. PRESSURE AT FULL CLOSURE AND AROUND A WIRE LINE**
- **HYDRAULIC OPERATION PROVIDES POSITIVE OPENING AND CLOSING—EFFORTLESSLY**
- **SELF-ENERGIZING FROM WELL PRESSURE**
- **PACKING RUBBER FIRMLY SUPPORTED BY STEEL FINGERS—WILL NOT "BUNCH UP"**
- **HYDRAULIC PISTON ACTION MAINTAINS PERFECT BALANCE REGARDLESS OF FLUCTUATING WELL PRESSURE**

Designed to assure high pressure well control while running tools or instruments on a wire line, the Regan Conical Wire Line Blowout Preventer is simple in principle, yet highly effective and completely dependable.

At any position the preventer retains absolute control of the well, regardless of pressure, and provides a completely unrestricted passage in open position. Unlike mechanical preventers, the Regan hydraulic preventer is always operable. It doesn't get stuck after closure. Its smooth hydraulic action, using either oil or gas as a pressure medium, frees you of all back-breaking manual effort. Once the closure has been made, independent hydraulic pressure is not needed to maintain it; the Regan preventer employs the well pressure. The packing rubber of the Regan preventer is supported top and bottom by alloy steel fingers. This prevents any bunching-up of the packing and provides a smooth even pressure around the wire. The fingers are moved by a piston assembly which is hydraulically forced up or down to achieve opening or closing. Since the areas in which the pistons travel are of equal size, the assembly floats in the housing, in perfect balance—unaffected by changing well pressure.

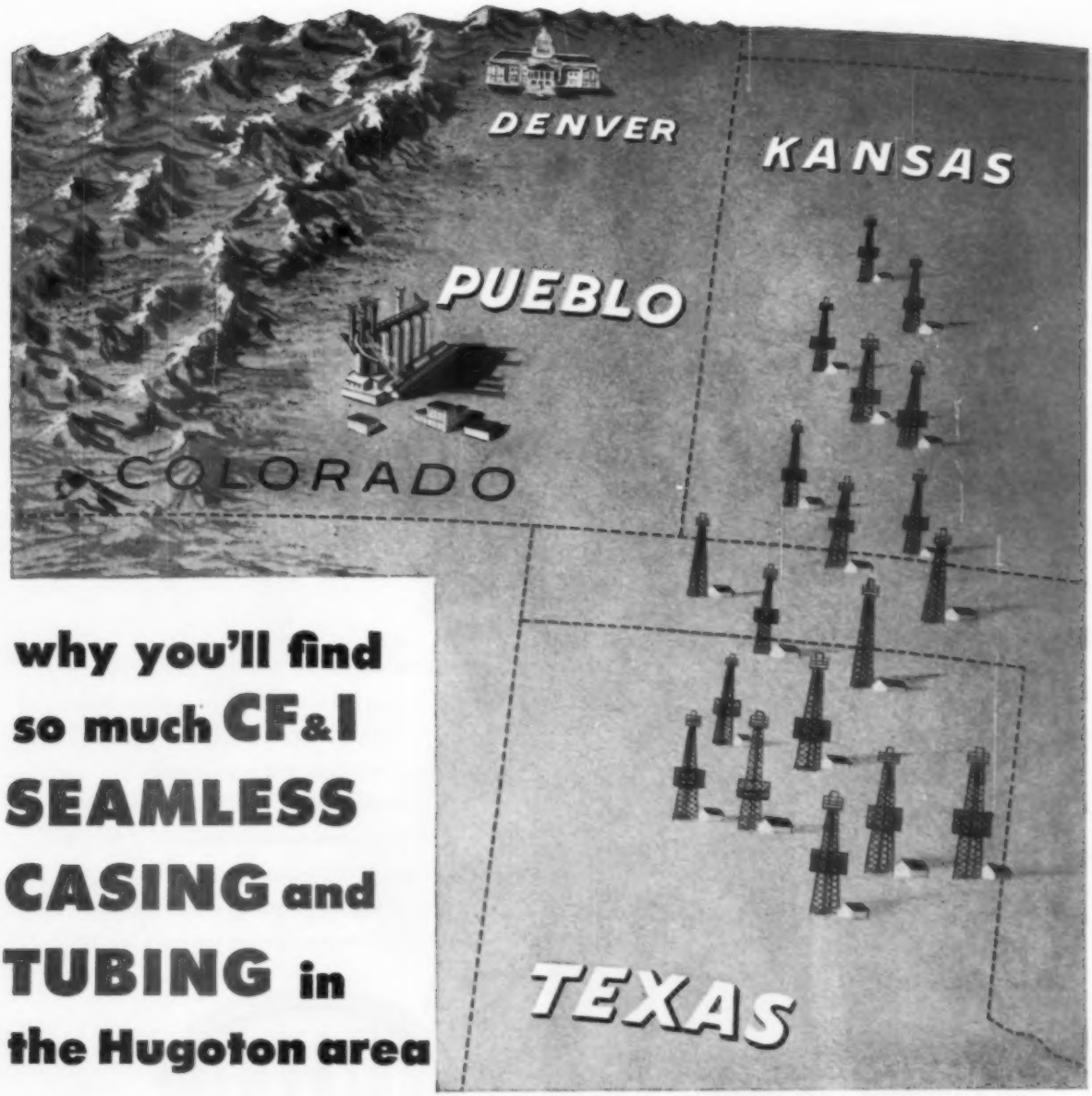
Investigate the advantages of the new Regan Conical Wire Line Blowout Preventer for your service operations. Contact Regan Forge & Engineering Co., or see your Mid-Continent Supply Co. dealer.

Regan® Forge & Engineering Co.

Quality – Wrought on the Forge of Experience

SAN PEDRO, CALIF. FORT WORTH, TEXAS

Exclusive Mid-Continent and Export Distributor:
MID-CONTINENT SUPPLY CO.
General Offices: Fort Worth, Texas



why you'll find so much CF&I SEAMLESS CASING and TUBING in the Hugoton area

Encompassing parts of four states, the Hugoton Embayment is one of the biggest gas and oil producing areas. Throughout this vast area, which is in close proximity to our Pueblo Mill, drillers and operators know the quality of CF&I Seamless Casing and Tubing. As a result, you'll see load after load of CF&I seamless oil country tubular goods that have proved their ability to give dependable, trouble-free service.

Meeting or exceeding API STD 5A specification, CF&I Seamless Oil Country Casing and Tubing is available in 2⅜" through 9⅝" O.D.

CF&I SEAMLESS casing and tubing API

4923

THE COLORADO FUEL AND IRON CORPORATION • DENVER, COLORADO

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So dependable it's the world's first choice!

Call him "Señor" or "Mister"—no matter where you go, you'll find oilmen trust the dependability of TOTCO. TOTCO double recorders are built to take the highest well pressures and the hottest bottom temperatures. And TOTCO's skillfully trained servicemen trouble-shoot the globe to make sure that TOTCO double recorders help get the *accurate* drilling job you need. That's why most oilmen the world over say, "Be sure you know, use TOTCO!"

TOTCO

Technical Oil Tool Corporation

1057 No. La Brea Ave. • Los Angeles 38, California

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With Magcobar on your well

the mud program is right to save you money

Savings begin even before spudding when the Magcobar team is working for you. A planned mud program — planned even before the rig is on location — saves money throughout the entire operation. These planned savings show up all along the line: in faster rate of penetration, in less downtime, and in economies from mud that is properly conditioned for logging and cementing.

A planned mud program will lower your over-all cost per foot of hole. You will have utilized everything modern drilling mud science has developed to insure safe, economical drilling.

Plan ahead! Plan now to make full use of Magcobar's *complete* drilling mud service on your next well. You get the best drilling mud chemicals. You get the mud industry's best trained and qualified engineers. You get the *full* facilities of Magcobar, the industry's largest producer of drilling mud.

Magnet Cove Barium Corporation
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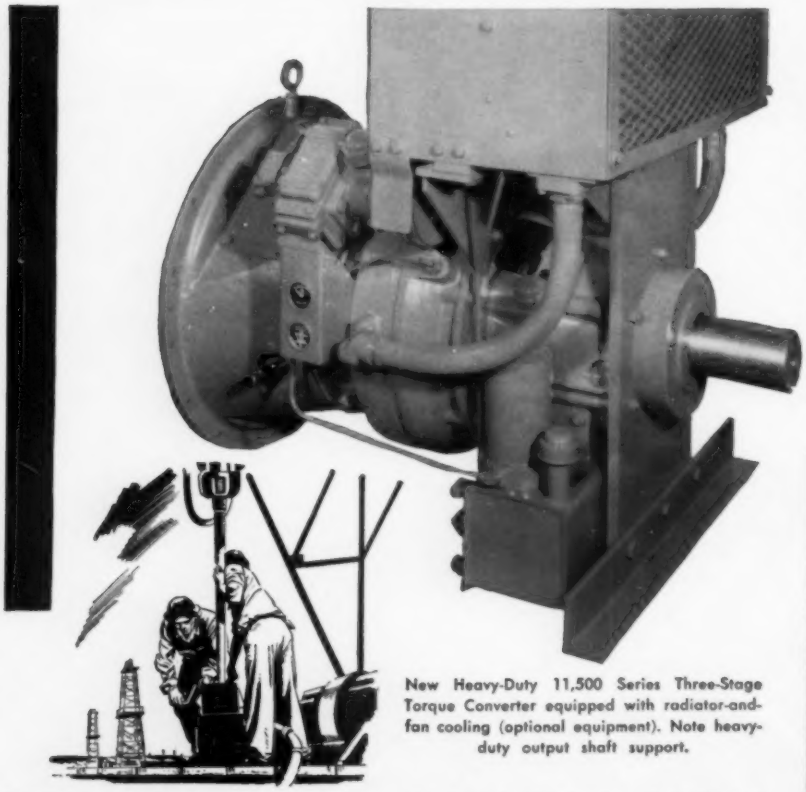
Magcobar®
Complete
DRILLING MUD SERVICE

57-100

Twin Disc announces new Heavy-Duty 11,500 Series Torque Converter



New Heavy-Duty 11,500 Series Three-Stage Torque Converter equipped with radiator-and-fan cooling (optional equipment). Note heavy-duty output shaft support.

Further extending its line of three-stage torque converters, Twin Disc Clutch Company now offers industry an additional version of its popular 11,500 Series Three-Stage Torque Converters.

Designated the Heavy-Duty 11,500 Series (a Standard-Duty version will be continued), the new units have a maximum rating of 586 hp at 2200 rpm. Maximum input torque is 1400 pound-feet. Impellers are available for specific torque ratings of 340, 390, 450 and 540 pound-feet.

Current production units include the Model CF, which provides a clutch at the flywheel, and the Model F, which is connected to the flywheel with a driving ring.

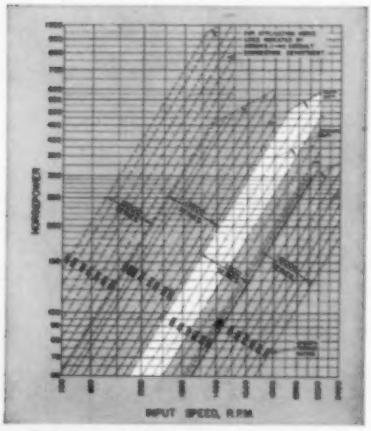
A Twin Disc C-3 Rear End, with the output shaft supported by two heavy-duty roller bearings, is available with either model, permitting maximum output sidepull.

The complete line of Twin Disc Three-Stage Torque Converters includes five distinct sizes; the 10,000 Series, Standard-Duty 11,500 Series, Heavy-Duty 11,500 Series, 13,800 Series and the 16,000 Series. The line offers 33 specific torque ratings and input and output arrangements to meet virtually every industrial requirement from 60 to 1000 hp and from 700 to 2400 rpm.

These three-stage torque converters have long proved themselves on such applications as crawler tractors, drilling rigs, shovels, yarders, locomotives and many, many others. They offer such advantages as multiplying engine input torque (up to 6:1) exactly as required by load . . . cushioning out destructive shocks and vibrations . . . minimizing maintenance and downtime . . . and *producing more work on a hp-cost basis.*

Twin Disc, the only manufacturer producing both three-stage and single-stage designs, offers single-stage torque converters for engines producing 30 to 212 hp. Besides this, Twin Disc makes available a complete line of fluid couplings, to 850 hp, and friction clutches, to 1050 hp.

Twin Disc Clutch Company, Racine, Wisconsin; Hydraulic Division, Rockford, Illinois . . . with parts and service facilities throughout most of the world.



Unshaded area in above curves compares hp and rpm characteristics of the Heavy-Duty 11,500 Series Torque Converter with other Twin Disc Three-Stage Torque Converters.

TWIN DISC
Torque Converters

ALL DRESSED UP... AND Going Places!

Here's the "New Look" in the Oil Country. Sleek new cars dressed up with the brightest name in service and equipment . . . Continental-Emsco.
Look for Continental-Emsco's new cars and stores throughout the oil country — it promises that you can count even more on Continental-Emsco to provide the best equipment and service to the oil and gas industries.
Continental-Emsco Company (a division of The Youngstown Sheet and Tube Company), General Offices: Dallas, Texas; Plants: Los Angeles, Houston and Garland, Texas; Export Offices: 45 Rockefeller Plaza, New York.

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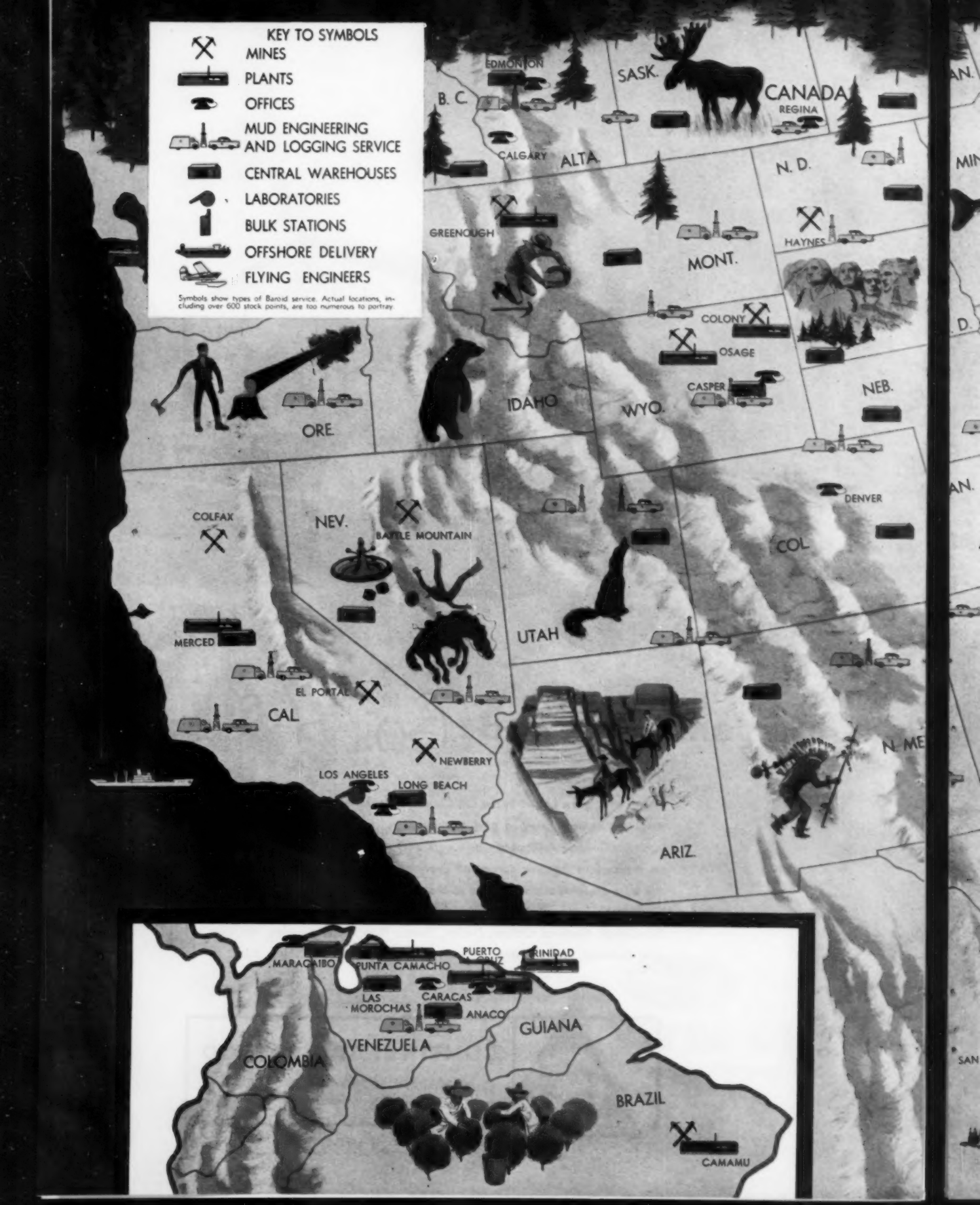
Serving the Oil and Gas Industries ... Worldwide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Symbols show types of Baroid service. Actual locations, including over 600 stock points, are too numerous to portray.
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A. F. KNAPPENBERGER
DRILLING CONTRACTOR • OIL OPERATOR
GRAHAM, TEXAS

April 25, 1957

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

We started using your pumps back in 1937 and have continued to do so to the present time. We now have one HP-8000 and one HP-14000 in operation, which we believe is the most economical pump on the market to operate today.

The above two pumps have been in operation for several years, with practically no cost to us at all.

We operate the two rigs in North Texas area and drill contracts, interest deals, and our own account from 2000 to 7500 feet.

Yours very truly,

K&H DRILLING COMPANY

By: A. F. Knappenberger
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20-Year User

of

WHELAND SLUSH PUMPS

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low-cost operation!

Currently in use by K&H are Wheland HP-8000 and HP-14000 Pumps:

". . . in operation for several years with practically no cost to us at all."

—A. F. Knappenberger, Partner

On location in North Texas, the Wheland HP-8000 pump which has performed so well for K&H Drilling Co.

At the side, left to right, are Mr. Alton Henley, Co-owner; Mr. A. B. Drake, Wheland representative; Mr. A. F. Knappenberger, Co-owner.

WHELAND

HP-8000 DUPLEX SLUSH PUMP
7-¼" x 12", 220 HP Nominal Input at 70 RPM

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HP-14000 DUPLEX SLUSH PUMP
7-½" x 14", 350 HP Nominal Input at 60 RPM

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Wheland builds a Complete Line of Efficient Slush Pumps.

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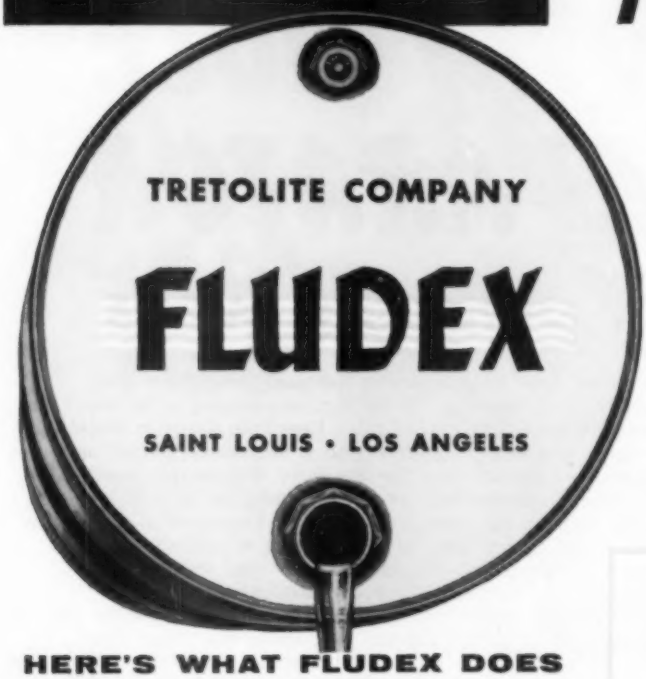

WATER FLOOD and WATER DISPOSAL STIMULATOR

enables formations to take more water... at lower pressures... in less time!

This new multipurpose chemical formulation is ideally suited for operation where combinations of scale, corrosion or bacteria are contributing to the malfunction of your flood or disposal systems.

HERE'S WHAT FLUDEX DOES ...AND HOW IT DOES IT

Makes Excellent WETTING AGENT.

FLUDEX conditions the surface of the formation so it will absorb more water more quickly at lower operating pressures.

Kills SULPHATE-REDUCING BACTERIA.

Destroys those bacteria which have the ability to reduce sulfates to hydrogen sulfide—which ultimately combines with soluble iron in the system to become insoluble, formation-plugging iron sulfide.

Inhibits CORROSION.

As a result of its bactericidal action, FLUDEX inhibits corrosion by reducing the production of corrosive hydrogen sulfide.

Aids in DEFLOCULATION OF SOLIDS.

By filming precipitates and suspended matter as soon as they are formed, FLUDEX eliminates the agglomeration of these objectionable deposits.

FLUDEX HAS BEEN FIELD-PROVED!

WRITE FOR YOUR COPY
of this new Booklet—describes the characteristics of FLUDEX, lists case histories, methods of application, etc.

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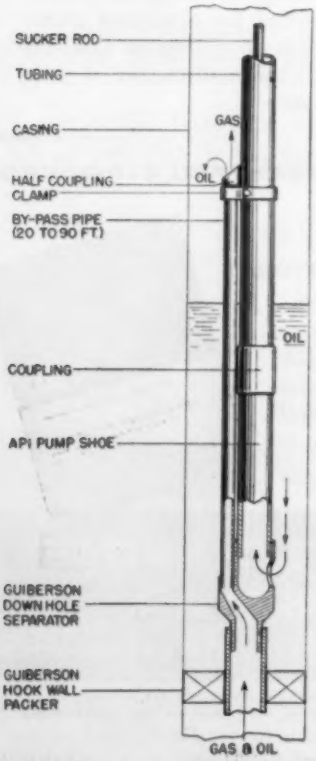
Answer To An Old Problem!

DOWN HOLE SEPARATOR

for pumping wells

Down Hole Separator

The Guiberson down hole separator increases production and eliminates the problem of gas locks, etc., in pumping wells where the produced fluid has a high gas/oil ratio. Less than a foot in length, the separator is screwed directly into a Guiberson packer and the pump shoe fitted directly onto the separator. One to four joints of by-pass pipe, depending upon the producing characteristics of the well, are screwed into the separator and clamped to the tubing. Attached to the top of the by-pass pipe is a half-coupling cut on a diagonal which guides the unit past casing joints. By-pass pipe hugs the tubing as snugly as couplings permit. Production crosses over from the tubing below the packer into the annulus above it and is carried well above the pump shoe by the by-pass pipe. The large annulus above the packer allows the gas to break out of solution and the oil drops back to the large reservoir above the packer where it is picked up by the pump, comparatively free of gas. The separated gas is bled off of the casing continuously. Intake ports on the separator have a larger by-pass area than the tubing. The separator is precision machined from cast steel.



Schematic Installation

ENGINEERING DATA

Part Number	Minimum Casing O.D.	Tubing Size And By-Pass	Maximum Metal O.D.	Approximate Weight	Approximate Length
29439	4½"	2" x ½"	3¾"	12#	13¾"
29133	5"	2" x ½"	4⅛"	14#	10½"
28369	5½"	2" x ¾"	4½"	15#	10⅜"
28645	5½"	2" x 1"	4½"	15#	10⅜"
29606	5½"	2½" x ¾"	4½"	15#	16"
28370	7"	2½" x 1"	5⅜"	20#	11⅛"

Note: The 4½" x 2" and 5½" x 2½" sizes have NUE 10 round top and EUE 8 round bottom field connections; all other sizes are EUE 8 round both ends. When ordering specify part number, casing, tubing and by-pass size.

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
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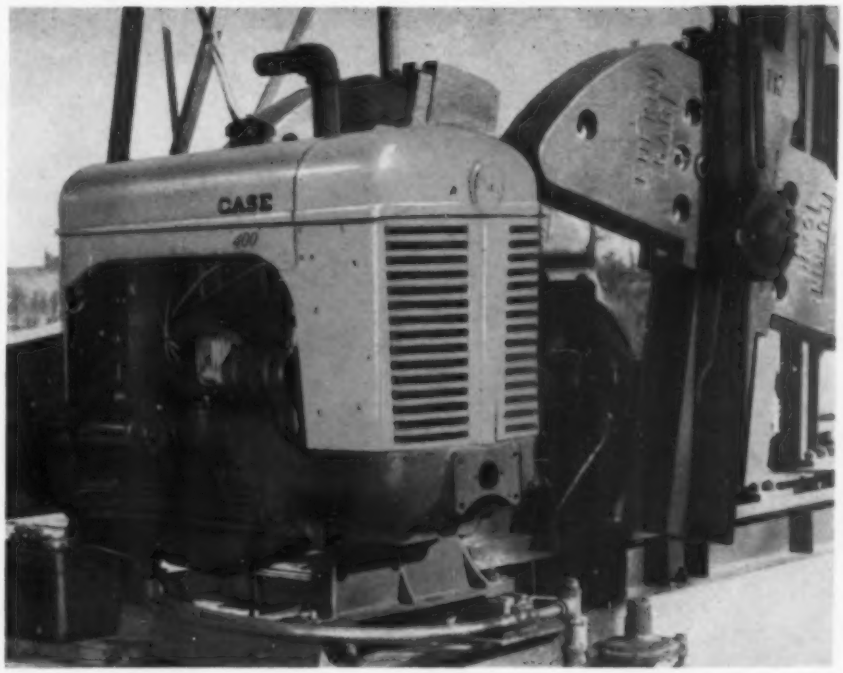
Sold by
Oil Field Supply Stores
Everywhere

CASE® OILFIELD ENGINES

cut costs three ways



Job records prove that Case oilfield engines carry their rated loads for longer periods, with greater fuel economy, and lower maintenance cost than any other engines in their power class. In fact, many Case engines are *still pumping efficiently after 10 years of continuous service without major overhaul.* Here's why:

1. Longer operating life

Case engine-blocks are heavily ribbed, both inside and out, to give maximum strength and rigidity . . . keep bearings in proper alignment . . . and to prevent excessive wear under heavy loads. Dynamically balanced forged steel crankshafts have big bearings on each side of each connecting rod for smooth, vibration-free operation.

2. Greater fuel economy

Exclusive Case spark-ignition "Powerdyne" and diesel "Powercel" combustion chambers provide complete, clean fuel combustion with uniform "push" on cylinders. Overhead valve design, combined with Case-built *weather-sealed* magneto and positive cooling also help save fuel.

3. Easier maintenance

Wet-type cylinder sleeves and multiple cylinder heads insure quick, easy replacement after long service without moving engine from its base. Main bearing inserts can also be easily replaced without removing crankshaft.

CHOICE OF SIZES AND FUELS

Dependable Case oilfield engines are available in the following sizes — for diesel, gasoline, natural gas, or LP gas:

- **600 Series — 106 Max. Int. HP @ 1800 RPM**
- **400 Series — 70 Max. Int. HP @ 1800 RPM**

Smaller size engines are also available starting at 32 Max. Int. HP. (Note: above figures are for gasoline-powered units; RPM's shown are max. recommended.)

For *new* oilwell pumping installations, or for *re-powering*, you'll get more economical power with Case oilfield engines. Remember, too, you can depend on *fast parts service anywhere, any time* — through a world-wide network of Case engine dealers and factory-owned branches — one near you.

Clip . . . mail for more facts →

J. I. CASE CO. Dept. G1307, Racine, Wis., U.S.A.

- ☐ Send literature on Case oilfield engines
- ☐ Send name of nearest Case engine dealer

Name .....

Title .....

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C-E-68

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One of the world's leading manufacturers of carbureted and diesel engines • wheel and crawler tractors • earthmoving equipment • farm machinery

NEW *from* Tube-Kote

Unique TK-33 Baked Polyurethane Coating

Section of aluminum pipe coated with TK-33

Section of aluminum pipe coated with TK-33, then split open and bent flat.

Won't Crack, Craze, or Chip

EVEN TURNED WRONGSIDE OUT

The flexibility of new TK-33 gives you greater protection against chipping and peeling than any other product. The coating adheres to the metal despite dropping, smashing, or bending. In laboratory tests, a 5 mil coating of TK-33 passes a ⅛ inch mandrel bend. This ability of TK-33 to move with the metal means you are buying more protection with TK-33 than was ever possible before. In a standard G-E Impact-Flexibility Tester, TK-33 coated aluminum pipe passes 20 per cent elongation at 14.8 ft/lbs impact.

With these new high standards in impact and chipping resistance, TK-33 coated pipe also has excellent resistance to acid and caustic fluids. Resistance to abrasion is excellent. New TK-33 is your answer to corrosion problems in pipe for gathering lines, salt water disposal systems, flow lines, and similar uses.

This new product is a unique formulation containing polyurethane. Like all Tube-Kote products, it has been tested and proved.

Write or call for a Tube-Kote representative to demonstrate the amazing flexibility of TK-33. Or we will be happy to send you complete information and a sample coated with TK-33.

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NEW WAY
to better buys

This tool pusher is considering and selecting operating parts and maintenance items. He's doing it at the place that's been specifically designed for careful, simple

Continued on next page

Continued from previous page

and efficient buying—today's National Supply Store.

Like other National customers, he gains several advantages by shopping in a National Store—and you can gain them, too.

The planned arrangement of counters, bins and warehouse areas makes it easy for you to personally select and compare before buying. The National Store personnel are ready to give you complete up-to-date information and prices on the items you're considering. They'll fill you in on field performance that other operators have reported.

Most important of all, here's where you can see and learn about new, proven items—products that may improve your present operations.

Today's National Supply Store carries stocks that have been carefully selected and tailored to the needs of your area. Items not normally stocked are quick-ordered and rushed to you—the result of one of the most modern communications systems in the oil country.

You'll find that the modern facilities and services available in National Supply Stores will help you operate more efficiently. Why not take advantage of the NEW WAY to better buys—stop in at the local National Supply Store tomorrow.

It's built to last the

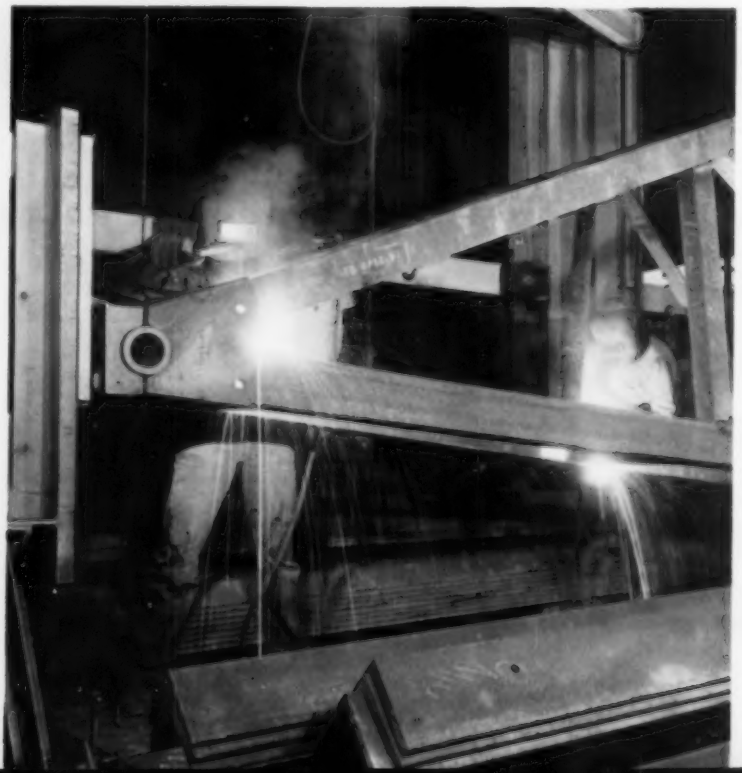
National "Type E" Pumping Units are as rugged and dependable as modern engineering and manufacturing can make them! Every feature and part has been designed to give you maximum service with a minimum of maintenance. Here are a few examples:

- Extra strong main base with maximum rigidity and counterweight clearance for quick, easy floor level installation.
- Tough, hard alloy steel gears and pinions—gear train mounting and main bearings permit lower shaft loading and deflection—easily handles shock loads from load reversals.
- Stable, well-balanced samson post—rigidly cross-braced, built to distribute beam load evenly over entire foundation area.
- Simple Pitman components assure positive alignment and correct fitting—are easily field-serviced.
- Extra heavy duty walking beam and beam hanger for years of rugged service.

National's complete line of pumping units includes 22 standard API sizes plus various long stroke and portable variations.

Sizes range from the D-3SN-6DP having a 3200 lb. API Beam rating and 6400 in.-lb. API Gear Reducer rating to the D-32SB-456 DW with 32,400 lb. API Beam rating and 456,000 in.-lb. API Gear Reducer rating.

Get all the facts on National's complete line of Pumping Units today. New bulletins describing these quality units are available at the National Supply Store or from National representatives in your area.



These welders use a special, extremely accurate jig for samson post assembly. This is typical of the quality manufacturing operations performed at one of the newest and most modern oil field equipment plants in the U.S.-National's Gainesville, Texas, plant.

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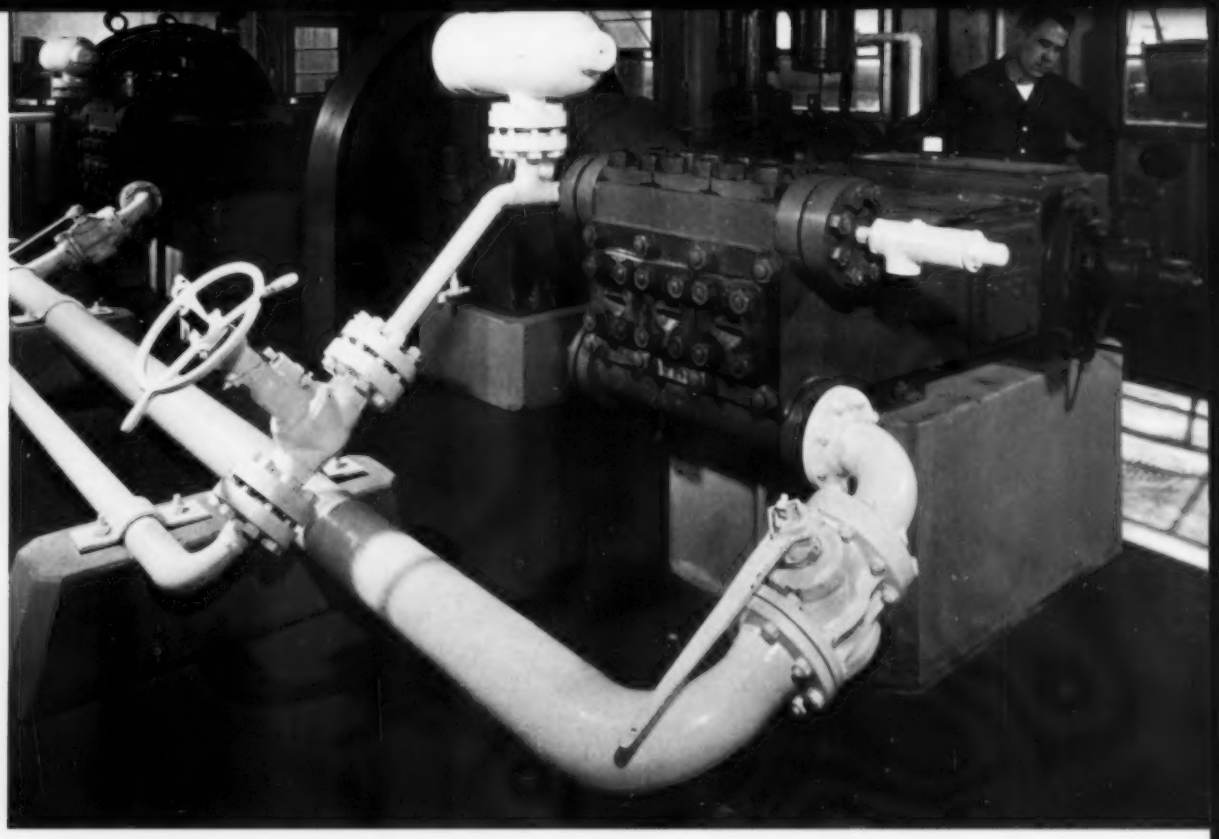
More National equipment for profitable production ...on the next page



For your special pumping jobs:

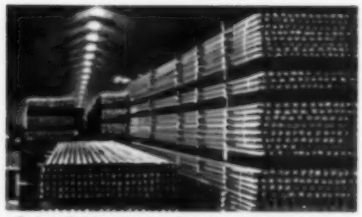
Rugged National Triplex Pumps!

Waterflooding is just one of the many jobs you can do profitably with National Triplex Pumps. They perform well on salt water disposal, high pressure testing, formation fracturing and acidizing, and as power-oil pumps for sub-surface hydraulic systems. Wherever you put them to work, they deliver dependably—with little service downtime.

National Triplex Pumps have heavy-duty frames and housings, long-life bearings, stainless steel valves, and National's time proven lubrication systems.

Plungers, fluid ends and stuffing boxes are interchangeable to meet varying pressure and volume needs and are available for either corrosive or non-corrosive service.

Check into all of the profitable features of National Triplex Pumps —the nearby National Supply Store or representative has complete information and bulletins for you.



Get reliable service from precision-made National Sucker Rods. They have top resistance to fatigue, shock, corrosion, and impulse loads. Available in a range of grades for every condition.

National Plunger Lift can be the best production method for certain types of wells. It uses formation gas or injected gas for operation. Ask your National Representative for details.

Interchangeable units provide many combinations to meet your specific needs in size, capacity, and type. Ease of assembly and pre-tested safety are two features of National Wellhead Equipment.

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Cronox

is the best way to stop corrosion in *your* well

Where corrosion protection is concerned, every well is different. The method and inhibitor to use depend not only on whether your well is flowing, pumping or gas condensate, but also on whether it has high water or low . . . packers or none . . . gas lift or natural flow.

There is a wide range of CRONOX inhibitors to apply to your well . . . including water and oil soluble types . . . vapor phase, stick and concentrated inhibitors . . . bactericides and combination bactericide-inhibitors. And Aquaness field men are thoroughly experienced in ways to use these inhibitors to tackle every type of corrosion situation.

Pennies for protection, using CRONOX inhibitors, can save you thousands in sucker rod and tubing replacement and lost production. Get your engineered corrosion control program started now, by calling your local Aquaness representative.

Write for a copy of the new booklet, "CRONOX Corrosion Inhibitors"

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Department
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2005 Quitman Street, Houston 26, Texas

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PUMPING UNITS

– the Lowest Priced Pumping Unit Available

Yes—Here is the Hydraulic Pumping Unit the Industry has long needed—simple, sturdy, trouble-free and priced substantially lower than any other type pumping equipment, mechanical or hydraulic.

From grass roots to 9,000 feet—that's the range of Johnston Hydraulic Pumping Units. More than 100 of these units are now in service (Gulf Coast, South Texas, West Texas), and have been operating for a sufficient length of time to prove their merit.

The low price of Johnston Hydraulic Pumping Units is due to streamlined, simplified design and manufacture, made possible by years of experience in production and hydraulics.

Remember this: Here is a pumping unit that will SAVE YOU MONEY—Cost You Less than any competitive unit; Less for Transportation; Less for Installation; Less for Maintenance; Increase Life of Sucker Rods, Bottom Hole Pump, and in many instances increase production.

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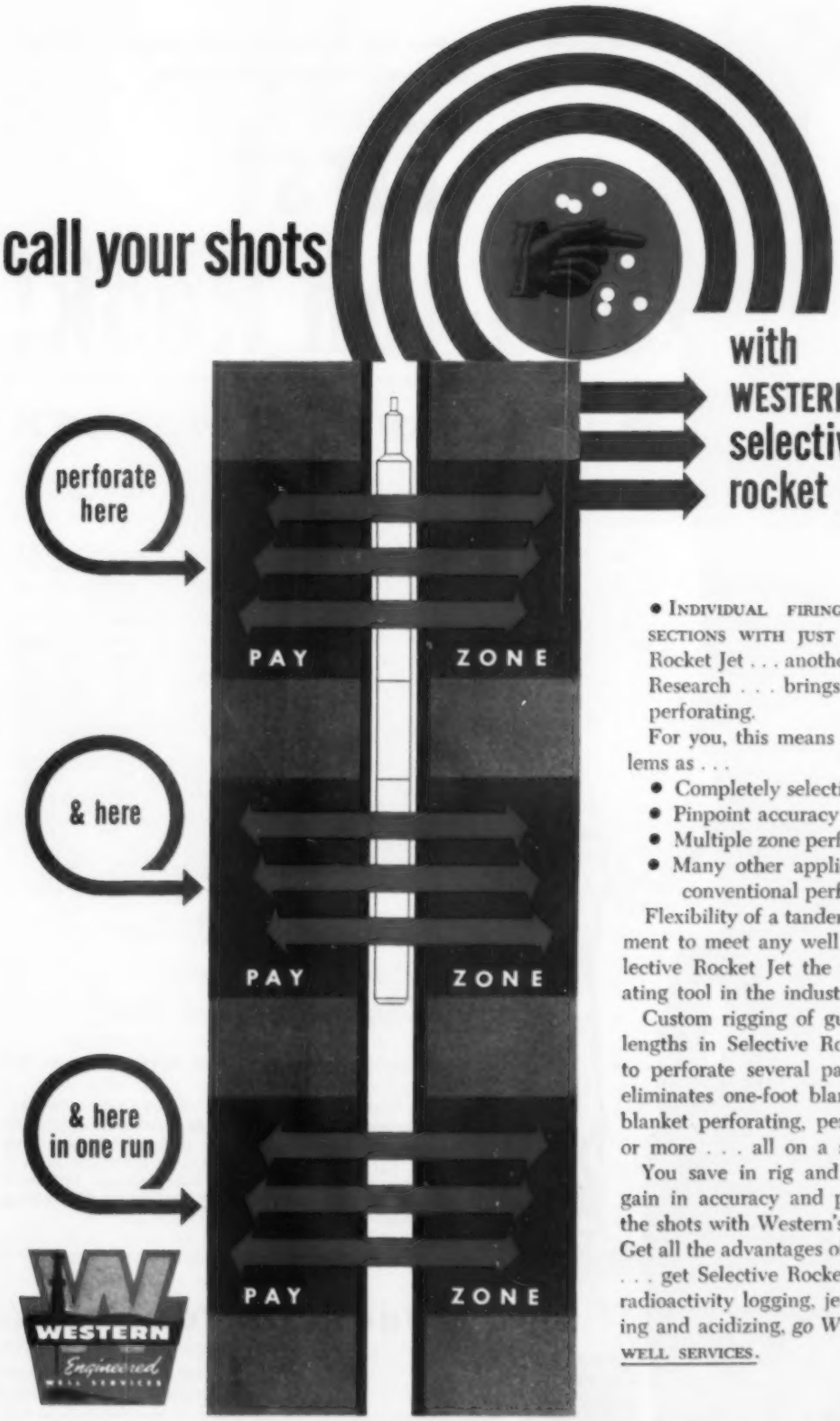
with WESTERN'S selective rocket jet



• INDIVIDUAL FIRING OF SEVERAL GUN SECTIONS WITH JUST ONE RUN! Selective Rocket Jet . . . another first from Western Research . . . brings this new service to perforating.

For you, this means solution to such problems as . . .

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- Pinpoint accuracy in blanket perforating
- Multiple zone perforating on a single run
- Many other applications impossible for conventional perforating

Flexibility of a tandem gun-section arrangement to meet any well conditions makes Selective Rocket Jet the most versatile perforating tool in the industry.

Custom rigging of gun sections in varying lengths in Selective Rocket Jet enables you to perforate several pay zones on one run, eliminates one-foot blanks between zones in blanket perforating, perforates eight-per-foot or more . . . all on a single run.

You save in rig and personnel time, and gain in accuracy and performance. *You* call the shots with Western's Selective Rocket Jet. Get all the advantages of Western engineering . . . get Selective Rocket Jet perforating. For radioactivity logging, jet perforating, fracturing and acidizing, go *Western* for ENGINEERED WELL SERVICES.

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Engineered to handle the longest drill-pipe strings and heaviest casing programs

First 500-ton Hook!

BJ "5500" HYDRAPLEX

Once again Byron Jackson gets to the petroleum industry first with the most. This time it's the first 500-ton capacity hook – a new concept in hook design with super-strength for safely handling the longest strings of drill pipe and casing ever run or contemplated!

The new tool is much more than a beefed-up version of the hooks you're used to seeing on drilling rigs. It was engineered from the ground up by BJ specialists. The result is Model 5500, a handsome giant, which no more resembles yesterday's hooks than today's automobiles resemble grandpa's buggy.

And the "5500" is packed with features that make drilling easier and safer. It has the patented BJ Hook Positioner which automatically turns the elevator handles toward the derrickman and takes the fumble out of pipe handling. There's the exclusive Hydraulic Snubber . . . no more drill pipe bounce, battered joints, nor high maintenance.

With the "5500" there's no lopsided elevator loading or swing and sway. A massive flexible pin connection allows an uneven load to automatically correct itself.

There's plenty of weight . . . 9950 pounds! It falls fast and straight even when the largest diameter lines are used. There's unmatched strength . . . a 500-ton API-rated capacity to give strength to spare in today's deep offshore and onshore operations.

For further information, ask your BJ field representative or write for the new Hydraplex bulletin.

BJ's Exclusive Hook Positioner is one Safety Device That's a Real Work Saver!

Taking the lead in supplying the industry with the heavier-duty equipment it needs, BJ recently introduced the first 500-ton capacity elevator-spider in a unique combination tool that serves in either function. The new 500-ton hook is another in the BJ line of larger, safer, stronger equipment that will one day be an absolute "must" for all deep drilling operations.

Byron Jackson Tools, Inc.

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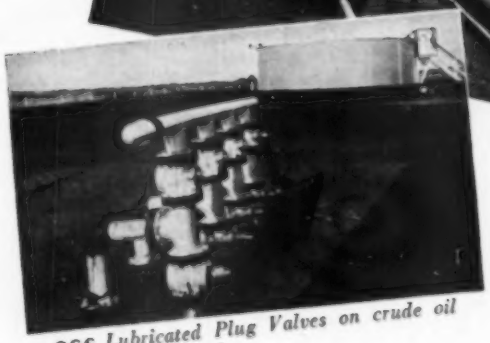
LUBRICATED PLUG VALVES

acf Valves on suction and discharge lines—natural gas compressor station.



acf Lubricated Plug Valves on crude oil storage tank header.

1. Wide Port—Maximum Flow Efficiency
2. Full Pipe Area
3. Patented Head Gasket made of tough self-lubricating Teflon*
4. Perfectly lubricated (gun or stick)
5. Tight against head leaks under any line pressure
6. Minimum number of parts
7. Lubricant protects against wear and corrosion
8. No exposed seating surfaces
9. Quick opening
10. Installed in any position
11. Compact: fits into small space; gate valve face-to-face dimensions where needed
12. Non-wedging cylindrical plug provides easy operation
13. Easily dismantled for repairs
14. Lubricant release to prevent contamination

*DuPont's tetrafluoroethylene resin. B704

Study this list of design and operating advantages and you will see why acf Lubricated Plug Valves are meeting the requirements of thousands of plants throughout the nation.

acf Valves permit your piping system to handle fluids with maximum efficiency at minimum cost in time, labor and power. Protected seating and sealing surfaces, leak-proof head seal, non-wedging plug reduce "down time" and maintenance to a minimum.

For higher efficiency—longer life—lower cost —specify acf Lubricated Plug Valves.

acf Valves are available in semi-steel, carbon steel, bronze and aluminum.

Sizes: ½" to 24".

Pressures: semi-steel; 175 lbs. WOG to 500 lbs. WOG.

Carbon steel: ASA 150 and ASA 300.

Representatives in all principal cities.

Ask your Industrial or Mill Supply Distributor for acf Valves.

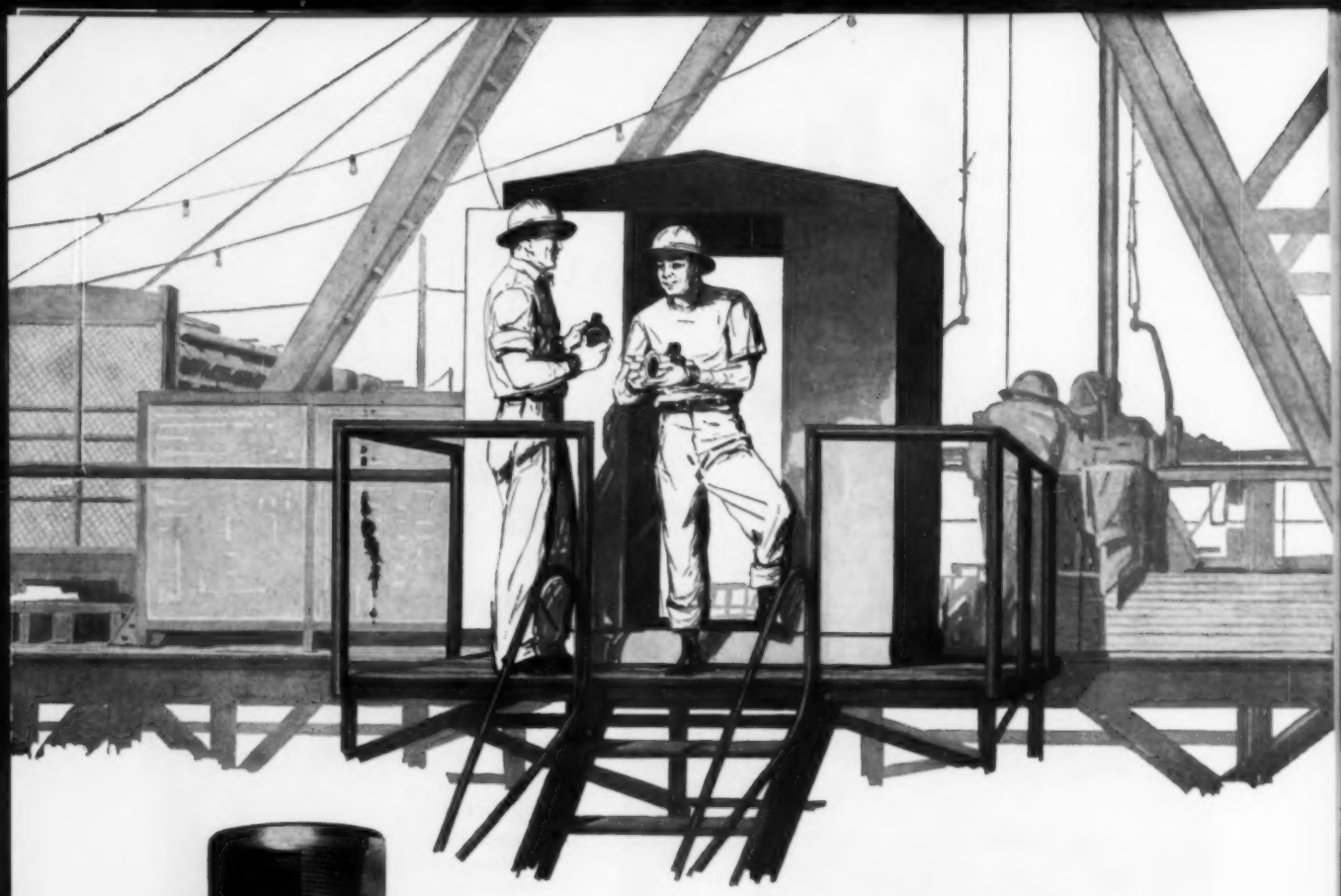
W-K-M

DIVISION OF acf INDUSTRIES INCORPORATED

PLANT: MISSOURI CITY, TEXAS
MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

Write Dept. F715 for new ACF Valve Catalog 400.

MANUFACTURERS OF W-K-M GATE VALVES acf LUBRICATED PLUG VALVES KEY-KAST ALLOY STEEL PIPING FITTINGS KEY RETURN BENDS AND FITTINGS



"I didn't realize there was such a difference in unions!"

And the difference is quite obvious when you compare Weco with other unions.

To start with—Weco's exclusive ball and cone seat design gives you the most perfect sealing possible. The spherical surface of the male sub seats on the conical surface of the female sub forming a positive, leak-proof seal. The sturdier construction of Weco Unions takes the most punishing service as part of a regular day's work. The Acme threads permit faster, easier make-up and break-out, day after day, without damage or distortion.

These differences in the design and construction of Weco Unions pay dividends in longer life and superior sealing service.

Ask for Weco Unions at supply stores everywhere. They are available in the exact size and pressure required for all oil country connections.

U-8-56

WECO®

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of*
FOOD MACHINERY AND CHEMICAL CORPORATION

DU PONT

...Better Things for Better Living ...through Chemistry

PETROLEUM ENGINEERING NEWS

LATEST PROPERTY AND APPLICATION DATA ON

TEFLON® tetrafluoroethylene resins

New heat- and acid-resistant seals of TEFLON® tetrafluoroethylene resins check high pressures in oil-well tubular joints

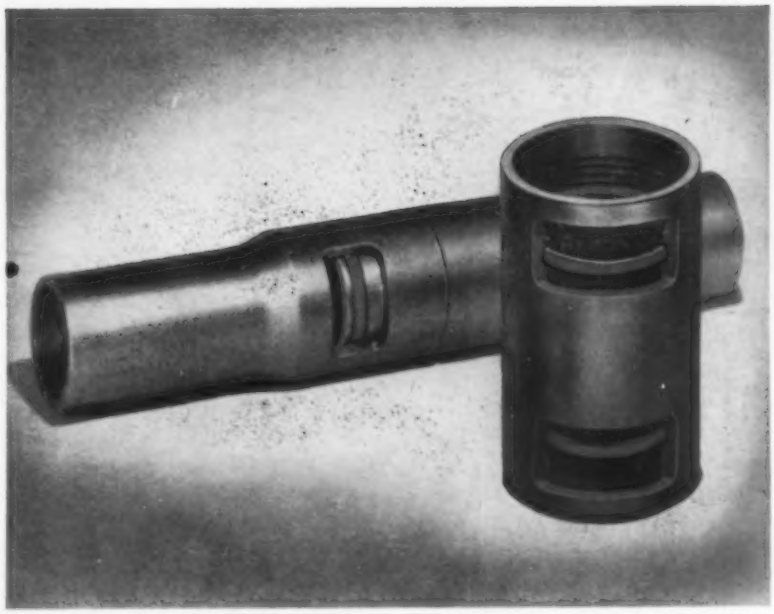
Even the ultra-high pressures in Gulf Coast oil and gas wells are tamed by seals of TEFLON resins. The Hardy-Griffin Engineering Corporation uses such seals as the basis for its new joint and coupling designs for well tubing and casings.

Some of the test results have been eye openers to oilmen. The seals pass hydrostatic tests to 17,500 psi without trouble. They develop no leakage in tests which subject them to 100 cycles of thermal shock and gas pressurization between 95° and 180°F. and 13,000-15,000 psi. The tests greatly accelerate the effects of alternate well flow and shut-in.

TEFLON tetrafluoroethylene resins are rated for continuous use up to 500°F. They are inert to virtually any chemical encountered in oil extraction and refining, in petrochemical processing or in commercial practice. The few exceptions to this include attack by the alkali metals under certain conditions. At high temperatures and pressures, halogens and certain halogenated chemicals and solvents may also affect TEFLON resins. TEFLON resins are prized for fabricating seals, gaskets, packings and bearings due to their toughness, flexibility, low surface friction and limited cold flow.

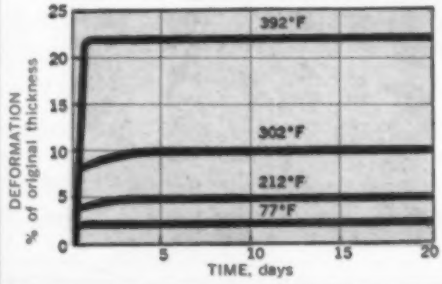
The cold-flow properties of TEFLON resins give Hardy-Griffin sealed joints ability to seal tightly. The sealed joints can be re-used under the most difficult conditions. Used API couplings, when modified to GT-API specifications with seal rings of these resins installed, are restored to like-new performance.

Many engineers in the chemical and mechanical phases of the oil industry have benefited by knowing the complete story about TEFLON tetrafluoroethylene resins. We'd like to show you how others have solved design and maintenance problems with Du Pont TEFLON resins. Send the coupon for a mailed reply.



RING SEALS made of TEFLON tetrafluoroethylene resins prevent leakage at pipe joints in wells developing high pressures and for mild low pressure. Seals are extremely resistant to acids and heat. Front — GT-API sealed coupling. Background — mating HGT "Super-Slim" integral sealed tubing joint. Cutaway sections reveal position of seals. (Manufactured by Hardy-Griffin Engineering Corporation, Houston, Texas.)

Effect of long-time compression on solid TEFLON®, 1,000 psi tetrafluoroethylene resin



Curves show deformation of a seal made of a TEFLON tetrafluoroethylene resin as a function of time and temperature. Tendency to cold flow is not excessive and occurs only during first few hours after load is applied. Equilibrium is rapidly reached and no further change occurs unless load or temperature change. TEFLON has good recovery after deformation, permitting re-use of seals.

TEFLON®

is a registered trademark...

TEFLON is the registered trademark of the Du Pont Company. It should not be used as an adjective to describe a product of another concern, nor may this registered trademark be used in whole, or in part, as a trademark for any product.

SEND FOR INFORMATION

For additional property and application data on Du Pont TEFLON tetrafluoroethylene resins, mail this coupon.

E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Dept. Room 357, Du Pont Building, Wilmington 98, Delaware

Please send me more information on Du Pont TEFLON tetrafluoroethylene resins. I am interested in evaluating this material for_____

*Name*_____

*Position*_____ *Company*_____

*Street*_____

*City*_____ *State*_____

*Type of Business*_____

In Canada: Du Pont Company of Canada (1956) Limited, P. O. Box 660, Montreal, Quebec

WAUKESHA

LONG LIFE

OIL FIELD POWER UNITS

Typical Long-Life Utility Unit—Model XAHU

Continuous Duty Power—for long periods *without servicing*

The *Long-Life* oil field Waukeshas are special gas power units—with additional features and accessories built right in. That's why they operate without any of the usual routine maintenance and attention. Now, the inspections needed are few and far between.

Just give these *Long-Life* units a regular and uninterrupted fuel supply, and you'll make considerable savings—in pumping and compressor service for oil and gas pipe line feeder operation, and similar uses.

Basically these *Long-Life* power units have the standard gas engines—long famous for being rugged and reliable—that have made Waukesha the world's finest oil field power.

On these basic engines Waukesha assembles the many *Long-Life* design-specials including specially lubricated clutches; automatic oil levelizers; low tension magnetos, with individual coil, low wear spark plugs; special fan belts, and water stabilizing filters; water condensers, and automatic radiator shutters. You'll want details on all *Long-Life* features.

Send for descriptive bulletin 1702.

LONG-LIFE CONTINUOUS DUTY NATURAL GAS UNITS					RECOMMENDED 65% HP RATINGS				
Model	Features*	Bore & Stroke	Displ.	Speed (rpm) →	800	1000	1200	1400	1500
FCU	4-Ir	3¼ x 4	133	CONTINUOUS DUTY ratings shown are 65% of maximum hp available at indicated speeds →	7	9	11	13	14
XAHU	4-Ir	3⅝ x 4½	186		10	14	17	20	21
190-GLBU	6-A	3¾ x 4	265		19	23	27	31	32
195-GKU	6-A	4⅛ x 4	320		20	25	31	36	38
135-GKU	6-A	4¼ x 5	426		28	34	41	47	50
140-GZU	6-A	4⅝ x 5½	554		42	52	62	71	.....
145-GZU	6-A	5⅜ x 6	817		62	77	90	103	.....
WAKU	6-A	6¼ x 6½	1197		84	114	124	.....	.....

*Features: 4, 6—No. Cylinders; A—Aluminum Pistons; Ir—Cast Iron Pistons

WAUKESHA MOTOR COMPANY
WAUKESHA, WISCONSIN
New York • Tulsa • Los Angeles

350

MISSION Super-Service® LINER PACKING

MISSION Super-Service Slush Pump Liner Packing outwears all other types.

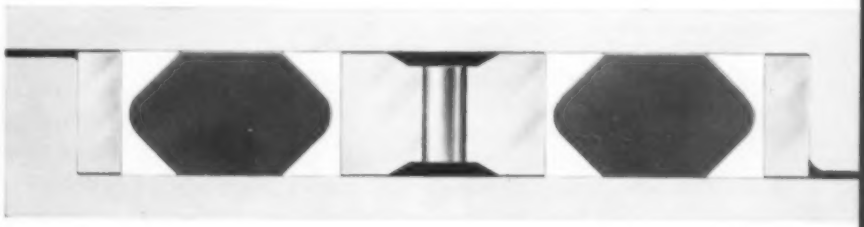
Under severe conditions (high pressures and worn pump bores) Mission Packing has outlasted others by as much as ten times.

Furthermore, Mission Super-Service Packing stays in adjustment. Since costly wear is reduced, frequent re-tightening is seldom required.

The reason for this outstanding performance is the *zero* clearance design shown below.

Write for the bulletin that tells the whole story. Better yet, try Mission Super-Service Liner Packing in your pumps. They are made in many popular sizes and are sold through all supply stores.

This cross-section shows how nylon back-up rings expand to provide zero clearance and perfect containment of packing elements when tightened. The metal end ring restores worn shoulders—adding reinforcement to the nylon. The result is long life with minimum adjustment.



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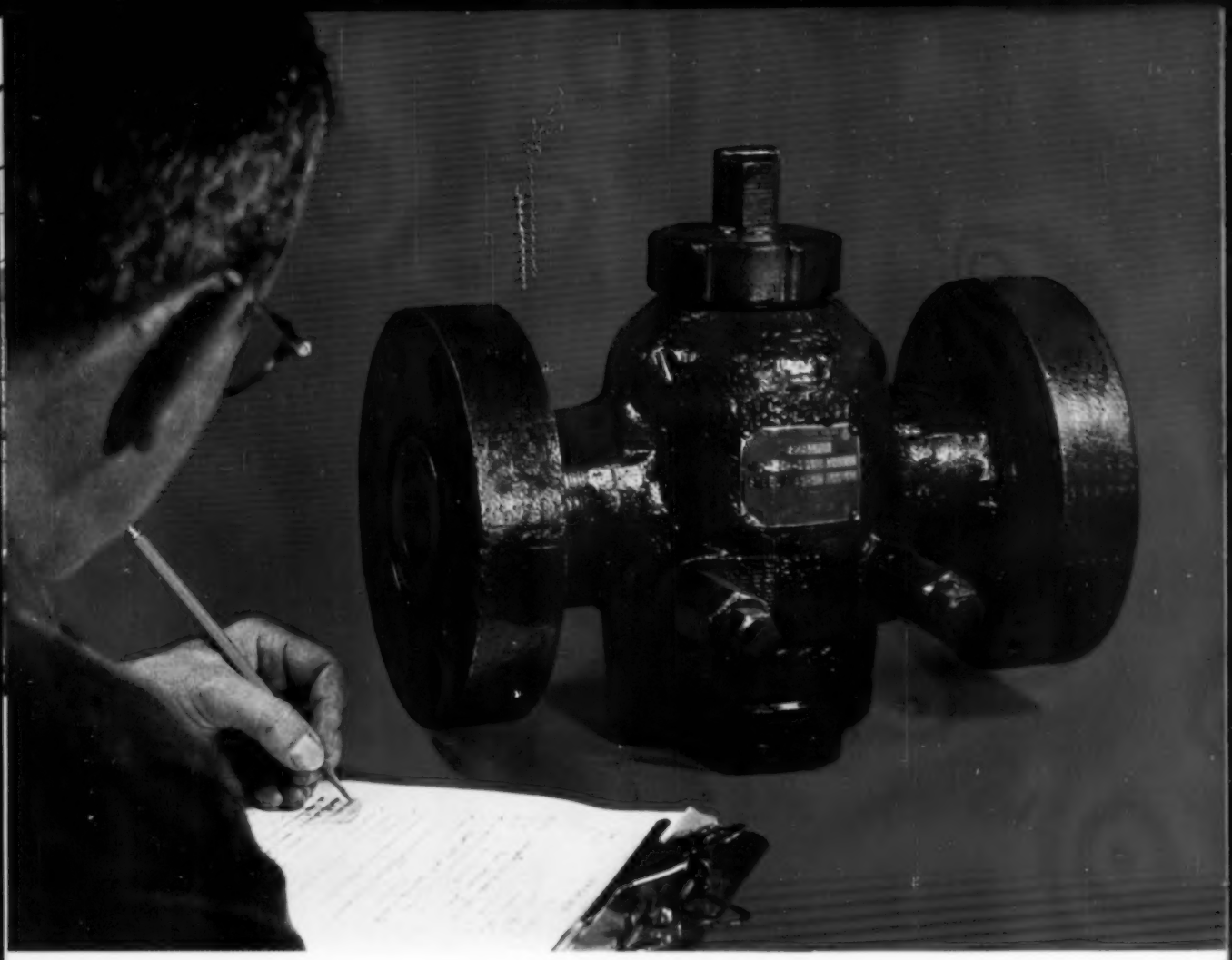
In The United Kingdom: MISSION MANUFACTURING CO., LTD. • *17 Hanover Square* • *London, W. 1, England* • *Cable Address—"Missoman"*
SLUSH PUMP VALVES • PISTONS • VALVE SEAT PULLERS • LINERS • PISTON RODS • VALVE SPRINGS • GLAND PACKINGS • • SLIPS • SWABS • PLUG VALVES • CENTRIFUGAL PUMPS



17 Years Old- Still Going Strong

After 17 years this Mission Plug Valve is ready for another long period of service

THIS MISSION PLUG VALVE bears the serial number 100. It was built in 1940 and for the past 17 years has served on the fill-up line of a blowout preventer on a South Louisiana rig.

It is shown here just before it was shipped back to the customer after being reconditioned by Mission. It again carries a new valve guarantee as do all Mission factory reconditioned valves.

Records show that it has been reworked only once during the last 17 years — a record seldom equalled by other types of valves.

Performance like this is not unusual for Mission Valves. Automatic Lubrication literally stops leaks before they start, preventing valve damage and increasing useful life. Because of their long life and freedom from maintenance, Mission Plug Valves are especially suitable for Christmas Trees, gathering systems, cycling plants and pressure maintenance plants.

Be sure to specify the name Mission the next time you order plug valves. They are available through supply stores everywhere.

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SLUSH PUMP VALVES • PISTONS • VALVE SEAT PULLERS • LINERS • PISTON RODS • VALVE SPRINGS • GLAND PACKINGS • SLIPS • SWABS • PLUG VALVES • CENTRIFUGAL PUMPS

It's a real slick little tool that can save you a lot of fixed capital investment - and bother - each year.

To obtain well pressure reading, insert master gauge with Connector in Gauge Valve and turn gauge 45 degrees. Gauge Valve opens automatically, exposing gauge to pressure. Remove gauge and Gauge Valve closes automatically.

HERE'S HOW IT WORKS: Instead of buying one or two pressure gauges for each Christmas tree, you buy just one master gauge *for an entire field*. Then, install these inexpensive Gauge Valves where you have been installing permanent type gauges—one on the tubing and one on the casing. Your Gauger takes the master gauge from well to well, stabs it into the Gauge Valve to obtain the pressure reading.

Only one gauge to buy.
No breakage.
No gauge repairs.
No exposure to elements.
No inaccurate pressure readings.

Ask any UNIBOLT man to demonstrate the Gauge Valve and Connector, or write:

THORNHILL UNIBOLT CRAVER CO.

P. O. BOX 1184 • HOUSTON, TEXAS

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World Wide Distribution

Homco is now the export distributor of Brewster Oilfield Equipment. This important addition to our world-wide service and supply organization places Brewster equipment near at hand whenever you drill for oil.

Homco representatives are familiar with the specialized supply requirements of foreign drilling. You can rely upon their experience for every need from the largest rig to the smallest part.

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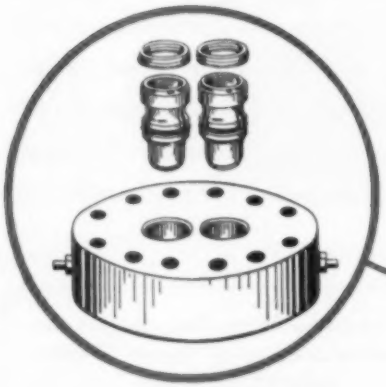
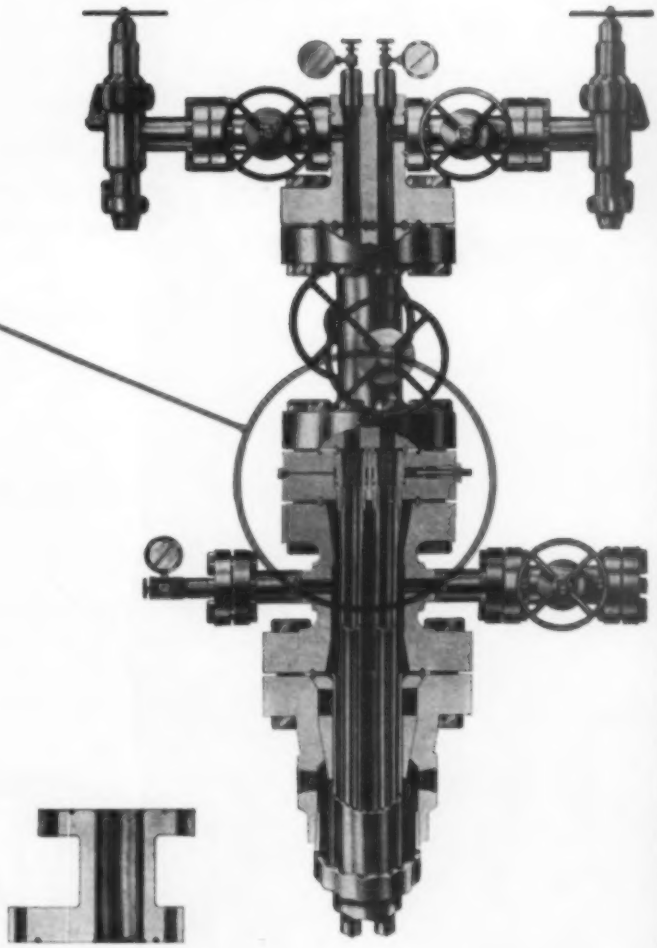
THE OIL INDUSTRY'S MOST COMPLETE SERVICE

RECTOR Dual-String Hanger Flange

Outstanding Simplicity and Flexibility, plus the FAMOUS Rector Metal-to-Metal Seal





SIMPLICITY: The flange has two full opening tapered bores in which the strings are suspended by threaded mandrels. This eliminates mating and sealing two tubing hangers in a single, large bore. Each string can be suspended, temporarily sealed, and held down independently of the other assuring maximum ease of installation with complete control of well.

FLEXIBILITY: Regular 2" API upset tubing can be run or pulled through the bores in the flange.

METAL-to-METAL SEALS: Each mandrel is independently sealed by a metal seal ring in the groove at the junction of mandrel and flange. This metal-to-metal sealing arrangement also acts as a hold-down. "O" Rings on the mandrel provide a temporary seal during completion and permit testing the seal after Christmas Tree is installed. Mandrels are grooved for hold-down locking screws, which are optional in the flange.

• **Rector Dual-String Hanger Flanges are available in Nom 6 and Nom 8 sizes in any series. Mandrels are interchangeable.**

For maximum simplicity and flexibility of dual-string suspension, plus the metal-to-metal seal that never requires maintenance or replacement, specify a Rector Dual-String Hanger Flange in your dual completion Christmas Tree.

Off-Set Adapter Spool permits use of regular preventer equipment with alignment directly over each individual bore while running and pulling tubing. After first string is run, Adapter Spool can be rotated to center directly over the other bore.

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★ MAKING THE OIL INDUSTRY SAFER
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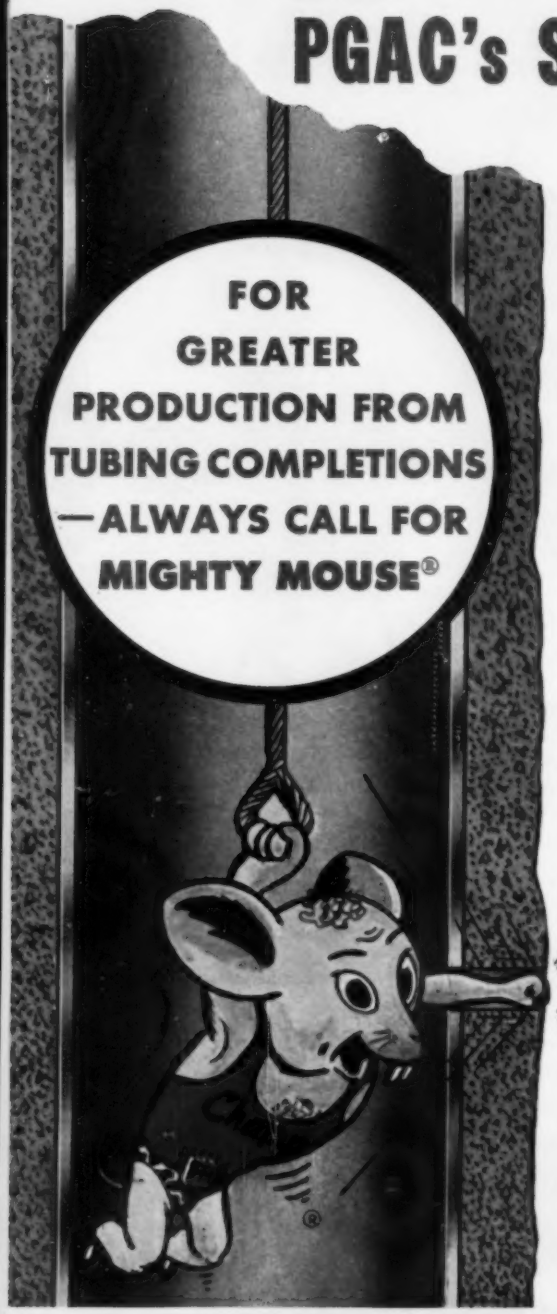
REPRESENTATIVES IN ALL ACTIVE FIELDS

Here's Your Best Bet—Always—
For Better PERMANENT COMPLETIONS...

PGAC's Super MIGHTY MOUSE®



. . . the most powerful fixed-diameter, tubing-type, expendable jet gun now available anywhere!

The 1¾" O.D. Super **Mighty Mouse** shoots either 5 or 6 jets per foot—the 2⅛" size shoots 4 jets per foot. All Jets fired horizontally into the formation, thereby utilizing **all** of their superior power for deeper, larger, debris-free perforations—all around the casing. Any length of formation can be shot, limited only by length of gun assembly that can be picked up and lowered into the well-head.

Here Are Some of the Reasons for the Phenominal Success of *Super* "Mighty Mouse" Jet Guns

- No carrot left to plug perforation after firing.
- No gun debris remains in perforated zone after firing to obstruct subsequent operations.
- Shoots deeper, larger and cleaner holes than any other fixed-diameter expendable gun.
- Semi-Flexible gun construction permits passage through kinked or bent tubing.
- Larger fluid bypass area speeds running gun in well—allows passage through pump-seat nipples and tubing constrictions.
- No over-all gun enclosure to leak fluid and cause misfiring—each charge separately contained.
- Unique safety features—firing initiated from bottom to determine completed operation.
- Penetration from the 1¾" gun almost equals that from 4" Jet guns . . . and from the 2⅛" gun penetration exceeds that of 4" Jet guns.
- Optional use of 5 or 6 shots per foot with the 1¾" gun reduces tubing completion cost.

MIGHTY MOUSE® IS STILL "CHAMP OF ALL THE MIDGET GUNS!"

PGAC-871

PERFORATING GUNS ATLAS CORPORATION

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LOUISIANA: Houma — Lafayette — Lake Charles. KANSAS: Great Bend — Harper — Liberal. NEW MEXICO: Hobbs.

AFFILIATE COMPANIES: CANADA — Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY — Atlas Deutsch- Amerikanische Olfelddienst G. m. b. H.; Kiel VENEZUELA — Servicios Tecnicos Atlas, C.A., Caracas

the LUFKIN formula

FOR SELECTING THE RIGHT PUMPING UNIT FOR YOUR WELL . . .

$$S_p = 35E + \sqrt{F^2 + M^2} + Q + P_e + f^{max}$$

E - EXPERIENCE, YEARS.

F - MODERN MANUFACTURING FACILITIES

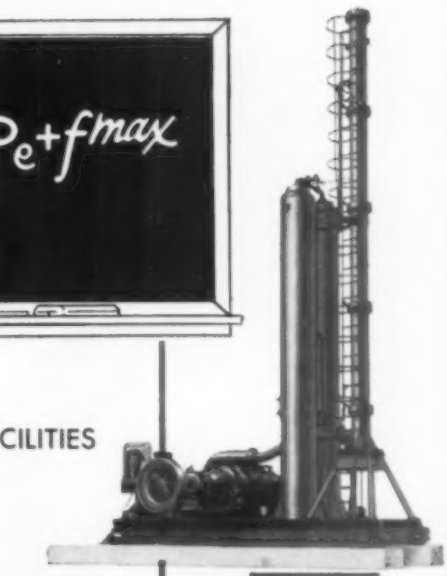
M - UP TO DATE METHODS

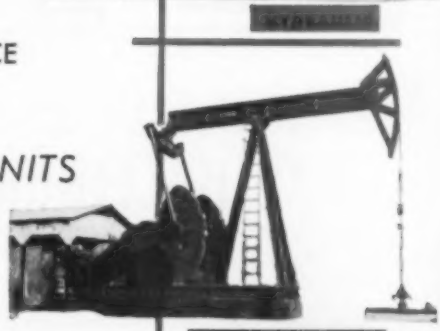
Q - BEST QUALITY MATERIALS

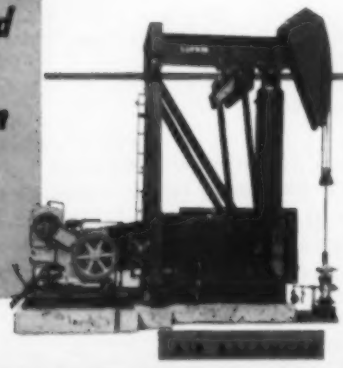
P_e - SOUND ENGINEERING PRACTICE

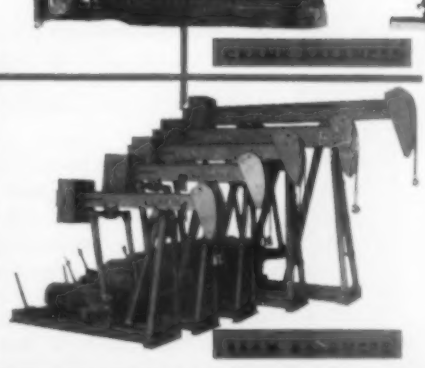
f^{max} - LARGE SAFETY FACTORS.

S_p - *SUPERIOR PUMPING UNITS*









There's always a standard LUFKIN unit with the right combination of beam capacity, counterbalance and peak torque for your well . . .

Lufkin FOUNDRY & MACHINE COMPANY

LUFKIN, TEXAS

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Lufkin equipment in Canada is handled by
THE LUFKIN MACHINE CO., LTD., 9950 65th Avenue, Edmonton, Alberta, Canada, Regina, Saskatchewan, Canada

SOLVE YOUR REMEDIAL PROBLEMS...

WITH HALLIBURTON *Squeeze cementing*

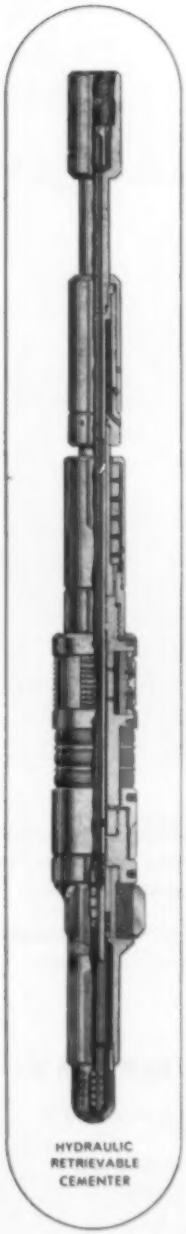
The most frequently encountered problems which Halliburton squeeze cementing has helped solve for thousands of well owners are—

- water or gas encroachment in oil producing zone
- repair of casing leaks
- isolation of producing zone prior to perforation for production
- to correct conditions such as channeling or insufficient fill-up on primary cement job
- plugging off crevices and cavities that cause lost circulation
- abandonment of depleted producing zones to prevent migration of fluids and reduce possibility of contaminating other zones or other wells

When a remedial problem troubles your well, call the pioneering cementers that have the greatest remedial experience and the most effective remedial products.. Halliburton.

HALLIBURTON
OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

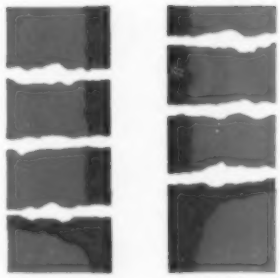
SUCCESSFUL FIRST AIDS FOR EFFECTIVE SQUEEZE JOBS



HYDRAULIC RETRIEVABLE CEMENTER

HYDRAULIC RETRIEVABLE CEMENTER

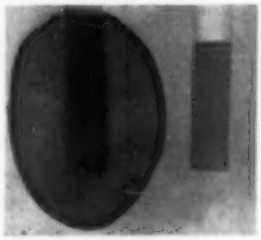
Designed to perform efficiently under the highest pressures and most difficult operating conditions encountered in squeeze cementing. Simply operated, easily set by hydraulic pressure. Tubing can be pressure tested up to 10,000 p.s.i. as packer is set. The HRC can be set, released and reset as many times as desired without coming out of hole.



HALLIBURTON'S DOC (Diesel Oil Cement)

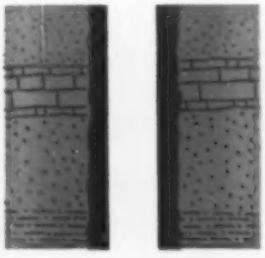
Uses water in the formation to produce a set cement of high density, high compressive strength and very low permeability. Widely used in squeeze job operations to aid in shutting off water in oil wells.

Since DOC is composed only of cement, diesel oil and Halliburton's efficient dispersant DOC-3, it will never set until contacted by water. After the initial contact with water, which thickens the slurry, the excess DOC is reversed out with ease. This desirable feature provides effective water shut-off with relatively small volume of this low fluid loss mixture.



RESIN-CEMENT

A blend of resins, water and portland cement with excellent "squeezing" characteristics. Successfully used for open hole bottom plugs, squeezing through perforations, setting around casing shoe or opposite water zones and other remedial work in oil or gas wells where ordinary cementing materials fail. The fluid phase that is squeezed from the Resin-Cement slurry penetrates into the formation and sets up in a firm, hard mass which gives a very effective seal that is resistant to oil, mud, corrosive waters and gases.



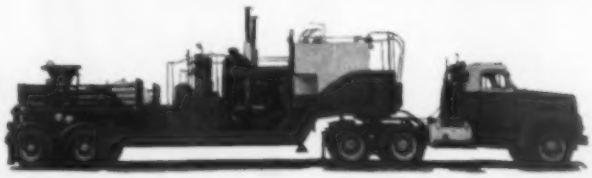
POZMIX 140

For extremely hot holes. Features long pumpability, controlled slurry weights, high resistance to sulfate and salt water corrosion. Tailored to meet specific well conditions. High temperature stability: Pozmix 140 is recommended for primary and remedial cementing in wells with bottom hole temperatures from 140° to 400° F or higher. Sets to a dense, durable product that provides year-after-year casing protection.

CEMENTING SERVICES

251 SERVICE CENTERS . . .

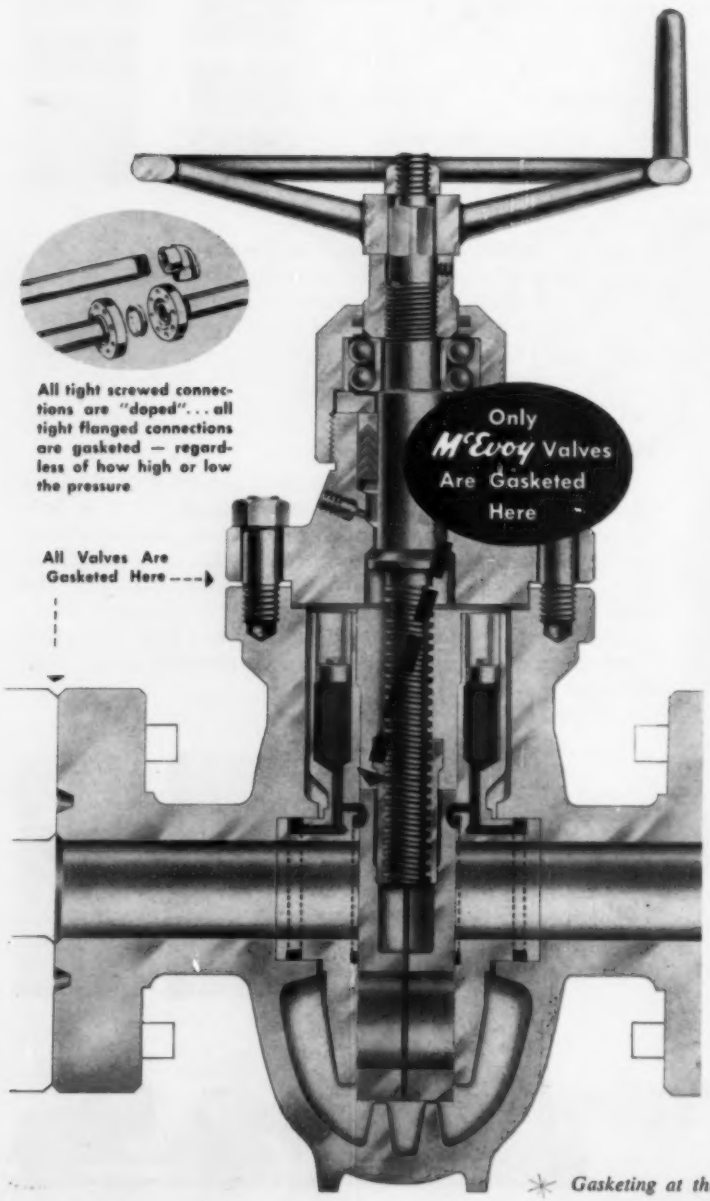
JUST MINUTES AWAY FROM YOUR RIG



FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD

WHY GASKET IMMOBILE CONNECTIONS...

BUT NEGLECT VALVE GATES & SEATS?


All tight screwed connections are "doped"... all tight flanged connections are gasketed — regardless of how high or low the pressure
Only McEvoy Valves Are Gasketed Here
All Valves Are Gasketed Here

It is common practice to gasket all screwed or flanged valve connections *to insure tightness*. But tightness is even more important between valve gates and seats *where movement occurs*. Each time a valve is operated, the gates move across the seats. *These movable parts must be gasketed* to prevent leakage not evident from the outside.

The exclusive McEvoy self-sealing system provides *automatic gasketing* between gates and seats . . . stops leaks the instant they start. This system consists of two identical and independent reservoirs which feed sealant automatically to downstream sealing surfaces in response to line pressure. Only McEvoy Valves provide this outstanding assurance of tightness.

Specify McEvoy Valves for all ratings and services. Available in Carbon Steel, Alloy or Stainless; and in ratings to 15,000 p.s.i. working pressure.

GET THE FULL STORY. Write today for complete information on McEvoy Self-Sealing Valves.

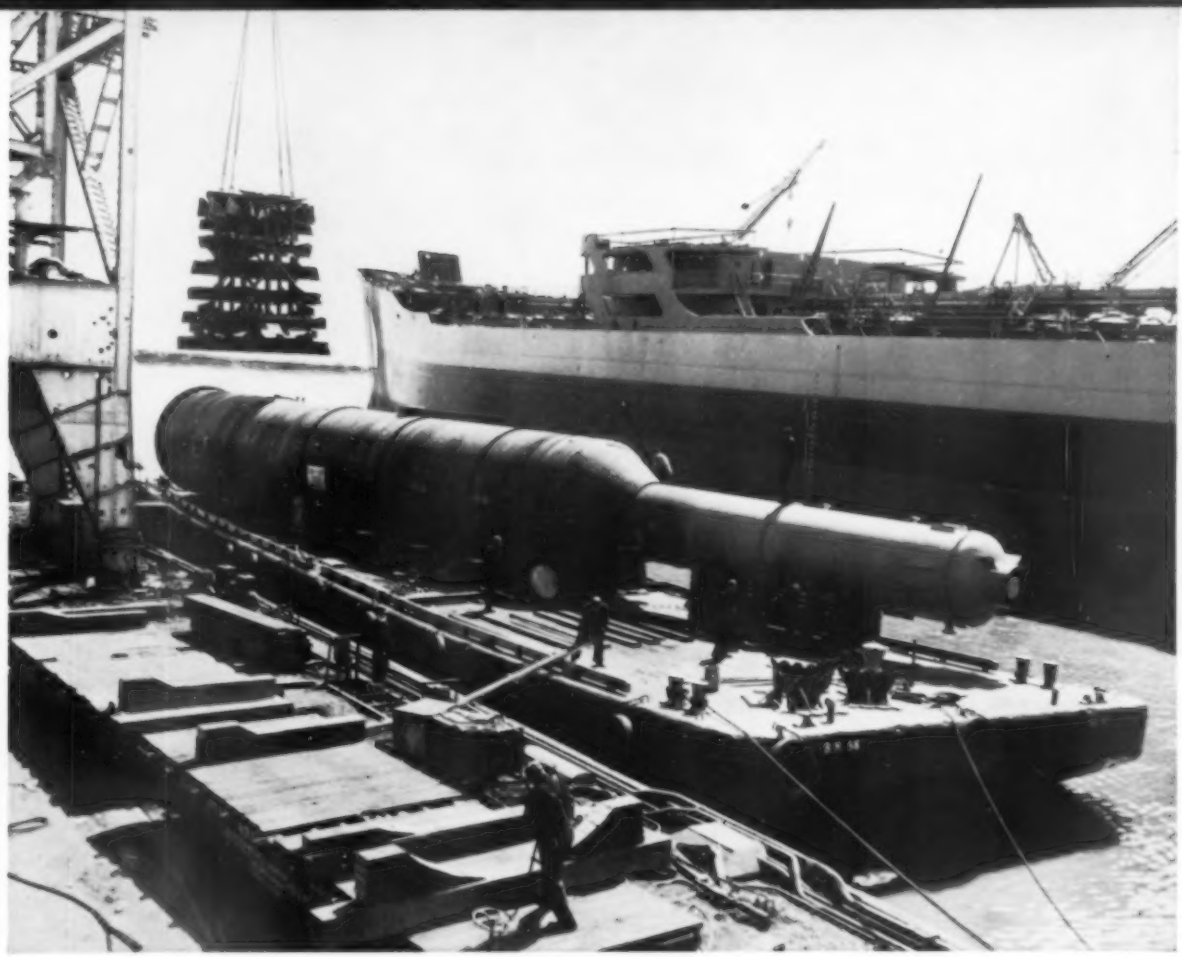
McEvoy COMPANY

OIL WELL EQUIPMENT

TEXAS AND MILBY ST. • P. O. BOX 3127

HOUSTON 1, TEXAS

✳ *Gasketing at this point is essential to maintain tightness.*



standard procedure: VERSATILITY . . .

The variety of work which Sun Ship's integrated shops produce for use by industries on land and sea brings a matching variety of shipping problems.

Our facilities for tidewater shipment are used to economical advantage on many of the massive structures that go into the making of the nation's petroleum and chemical industries. The barge shipment of tower and shed row baffles, shown above, is a good example.

And of course—when shipment by land is necessary—Sun Ship rigging and routing find the ways and means to handle such items as large-diameter columns by rail and truck.

It's all a part of the versatility which forty years' experience has made part of "standard procedure" in service of its customers.

Our Sales Engineering Department would be glad to use its experience in helping you overcome any problem of construction or shipment that faces you. Write

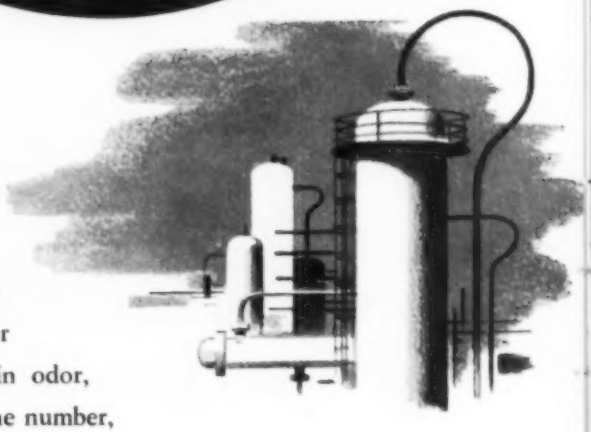
Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE (SINCE 1916) CHESTER, PA.

Versatility is TRADITIONAL at WESTERN

Versatility is important in **TREATING**



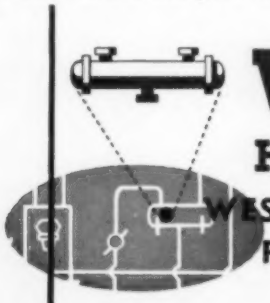
Treating petroleum fractions for the removal of sulphur, nitrogen, oxygen and other contaminants is a versatile hydrogenation process.

With a range of objectives which includes reduction in sulphur and nitrogen compounds—preparation of straight-run or cracked catalytic reforming feedstocks—improvement in odor, color, gum or storage stability, in burning properties, cetane number, lead susceptibility, and susceptibility to catalytic cracking—the equipment used in these process applications must provide an equal range of versatility.

Western Heat Exchangers are closely rated, carefully designed and accurately fabricated to meet the exacting demands of such treating processes—and merit *your* consideration and acceptance.

Western Heat Exchangers are used extensively and satisfactorily in hydrogen treating.

Western's representatives are at your command—**immediately.**



WESTERN
HEAT EXCHANGERS
WESTERN SUPPLY COMPANY
P. O. Box 1888 – Tulsa, Oklahoma

the most ECONOMICAL maintenance is PREVENTIVE maintenance

TWO OF THE MOST EFFECTIVE PREVENTIVE MAINTENANCE MEASURES ARE:

1 *98% to 100% SALT REMOVAL with Tretolite Chemical Desalting*

Tretolite Desalting prevents salts, solids, trace metals and other impurities from entering the refinery stream. It prevents salt plugging and fouling in condensers, exchangers and towers, reducing clean-outs and tube rattling to minimum. Tretolite Desalting is an automatic, all-chemical process that consistently delivers salt removals in the 98% to 100% range.

2 *EFFICIENT CORROSION PREVENTION with Kontol Corrosion Inhibitors*

Kontol Corrosion Inhibitors prevent internal corrosion and hydrogen blistering and help to eliminate scale and fouling difficulties. Kontols are readily adsorbed from hydrocarbon solutions at metal surfaces to form a tough impervious film. In addition to their inhibiting properties, the Kontols are powerful detergents which clean and de-foul refinery equipment.

Ask the man in the red car

The Tretolite Service Engineer is always on call to assist you in your maintenance and processing problems.

AR-57-1

TRETOLITE COMPANY

A Division of Petrolite Corporation

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5515 TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA

Chemicals and Services for the Petroleum Industry

DESALTING • DEMULSIFYING • CORROSION INHIBITING • SCALE PREVENTING
FUEL OIL ADDITIVES • WATER DE-OILING • METAL DEACTIVATORS

WOLVERINE TRUFIN®

SAVES YOU MONEY

8 WAYS

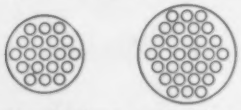
Anytime you cut down costs, you pep up the profit picture. Here's an idea: where heat exchange costs are concerned, Wolverine Trufin Type S/T—the integral finned condenser tube—can help you save money *eight* ways. Take a look at the points listed below. They can open the door to substantial savings, provide added dividends in increased efficiency.

✓ Because Trufin is an extended surface tube—with fins extruded right from the tube wall—it has more than twice the heat transfer surface of plain tube. Less tube is required because Trufin transfers more BTU's per foot of tube.

✓ Fewer tubes mean smaller shells, headers, baffles, etc. This saves material requirements.

✓ Fewer tubes mean fewer holes to drill—less rolling-in operations. Direct result: substantial savings in labor costs.

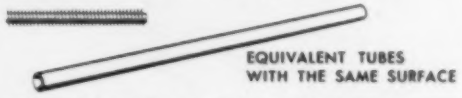
✓ To transfer a given heat load—when Trufin is used—much less weight of over-all tube metal is required. This is a real saving when expensive alloys are necessary. This is of greatest importance when alloys are in short supply, as a given quantity of metal in Trufin transfers much greater heat loads.



FEWER TUBES
MEANS SMALLER SHELLS

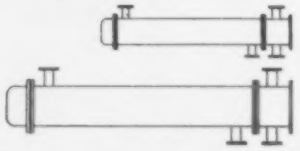
✓ Because of these material savings, lighter units—requiring less structural support—can be designed. This is vital when exchangers are to be mounted on superstructures.

✓ Maintenance costs are low. Costs of replacement tubes are reduced; fewer tubes result in less cleaning time, more "on stream" time. Actual operating data proves that Trufin withstands fouling for longer periods than does prime surface tube. This increases the length of operating time between change-overs.



EQUIVALENT TUBES
WITH THE SAME SURFACE

✓ Smaller, lighter units result in easier handling and lower shipping costs.



TRUFIN
MEANS
SMALLER
UNITS

✓ Where space is at a premium—as in revamped units—Trufin units are smaller.

There they are—eight job-proven ways in which Wolverine Trufin Type S/T condenser tube can save you money. Write for a copy of Wolverine's new book "Design and Cost Comparisons" today!

CALUMET & HECLA, INC.
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Manufacturers of Quality-Controlled Tubing and Extruded Aluminum Shapes

PLANTS IN DETROIT, MICHIGAN, AND DECATUR, ALABAMA. SALES OFFICES IN PRINCIPAL CITIES

EXPORT DEPT. 13 E. 40TH ST., NEW YORK 16, N.Y.

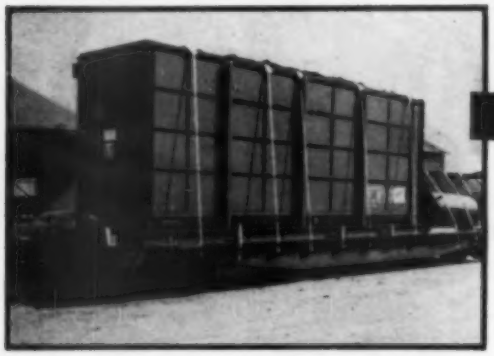
NOW A BORN HEATER for every process heating requirement

BORN "*UPFLO*" HEATERS

A horizontal tube heater for highest fuel efficiencies and even heat distribution.

BORN "*VERTIFLO*" HEATERS

A vertical tube heater for use where space is critical.



BORN "*PREFAB*" HEATERS

Rugged and versatile these units are shipped completely assembled and skid-mounted, eliminating field construction. Available either with HORIZONTAL tubes or VERTICAL tubes.

BORN "*PARIFLO*" HEATERS

Suspended tube design for ultra high temperatures and close zone control.

BORN HEATERS are especially designed for your heating requirements. Contact your nearest BORN representative for complete information.

BORN Engineering Company

Manufacturers of Direct-Fired "UPFLO" Heaters

TULSA, OKLAHOMA

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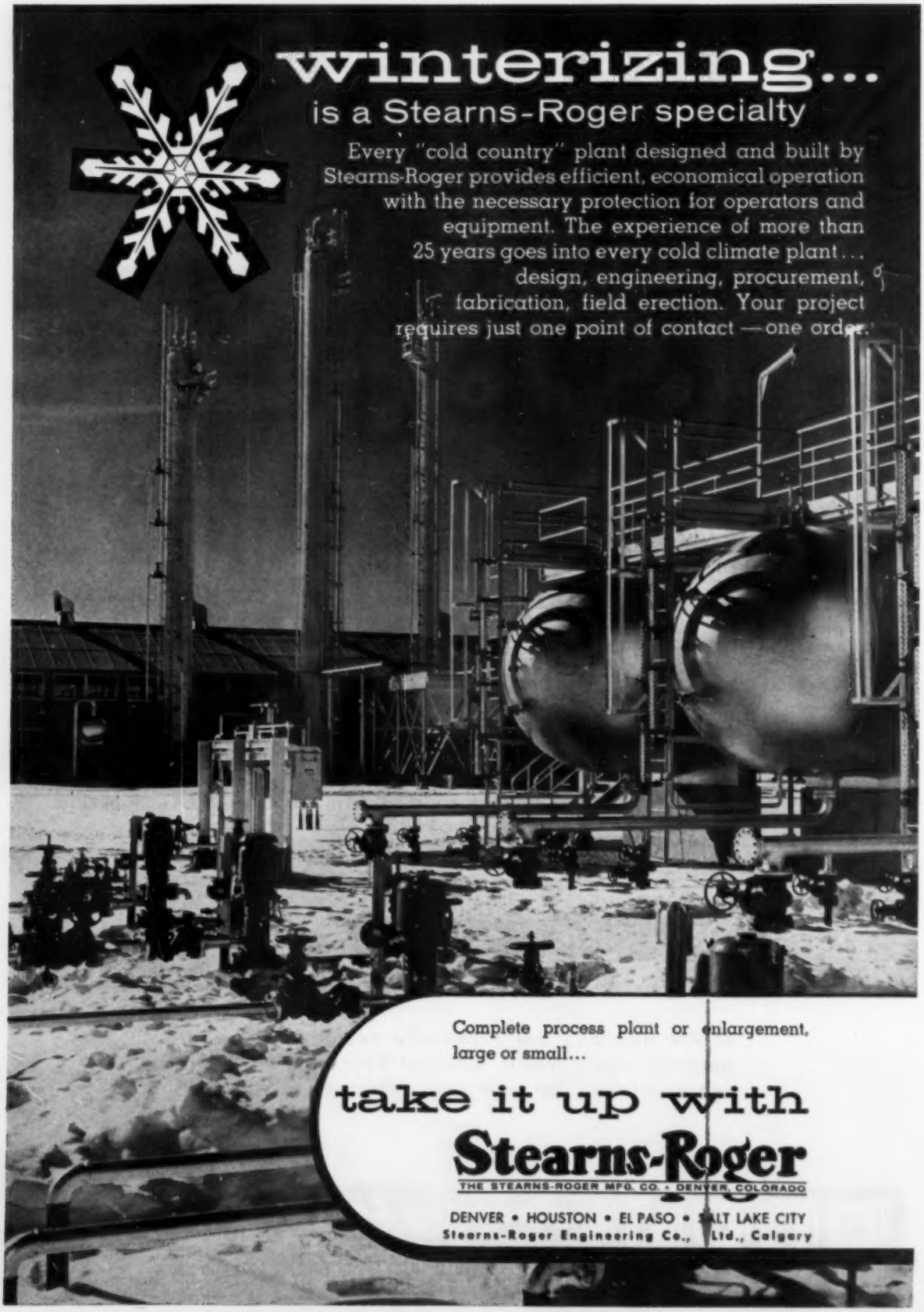
winterizing...
is a Stearns-Roger specialty
Every "cold country" plant designed and built by Stearns-Roger provides efficient, economical operation with the necessary protection for operators and equipment. The experience of more than 25 years goes into every cold climate plant... design, engineering, procurement, fabrication, field erection. Your project requires just one point of contact — one order.
Complete process plant or enlargement, large or small...
take it up with
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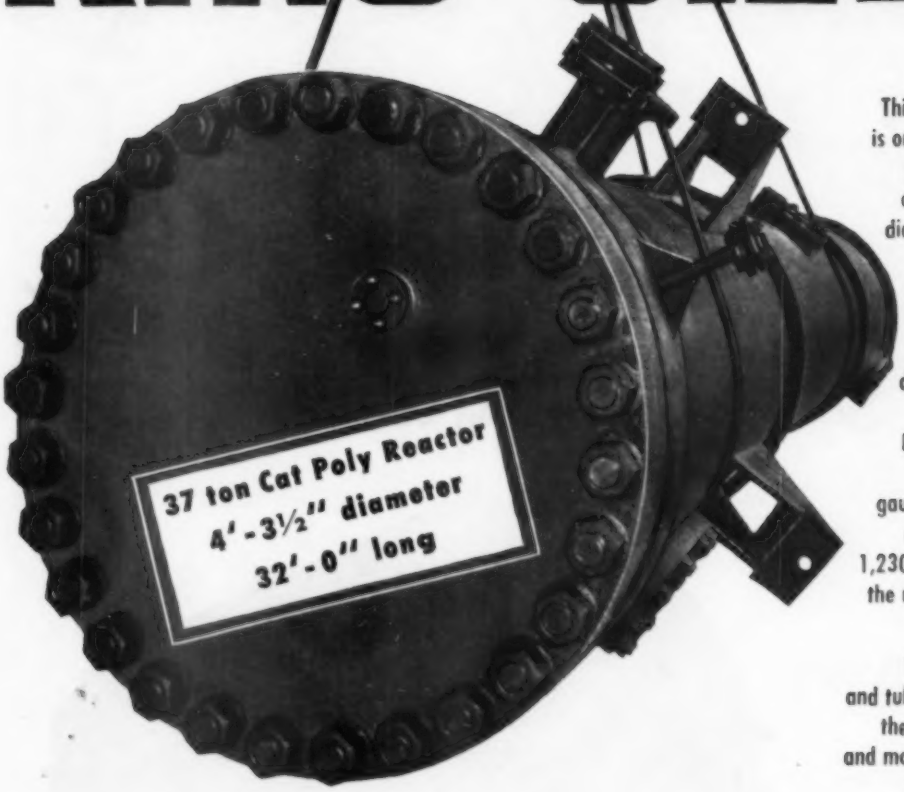
KING SIZE



This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

Vogt, a leading builder of shell and tube reactors for poly plants, has the competently skilled personnel and modern mechanical facilities with which to provide heat transfer equipment for the most exacting services in petroleum refineries, chemical plants, and related industries.

Reactors ...by Vogt

A bulletin describing the wide range of heat transfer equipment built by Vogt is available upon request.

24A-XRE

HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

BRANCH OFFICES: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.

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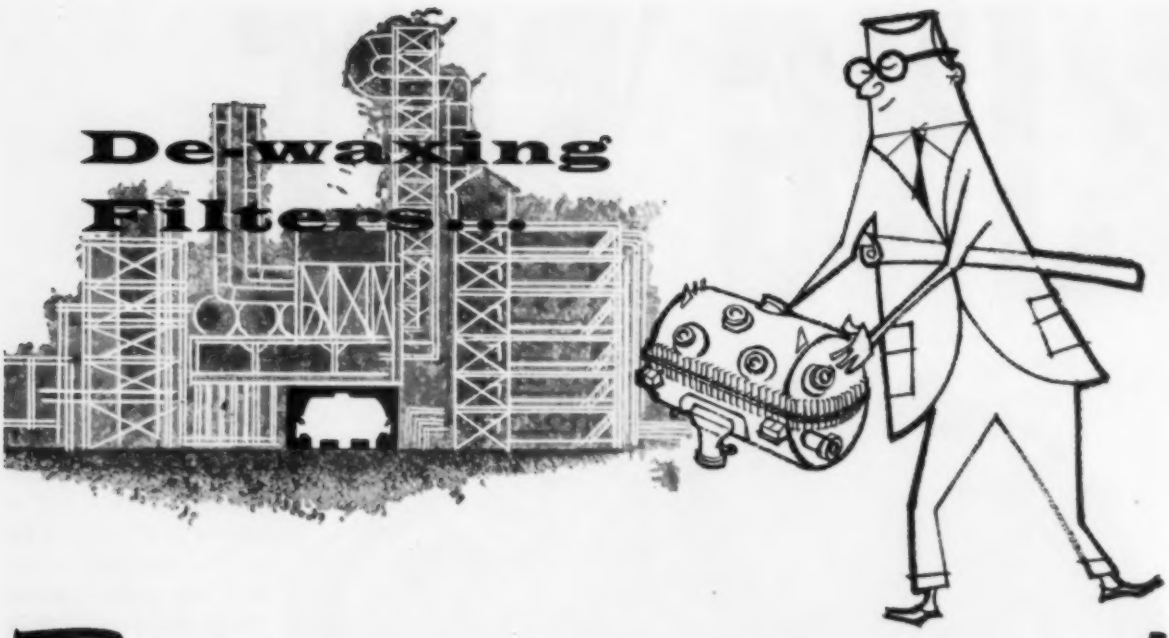
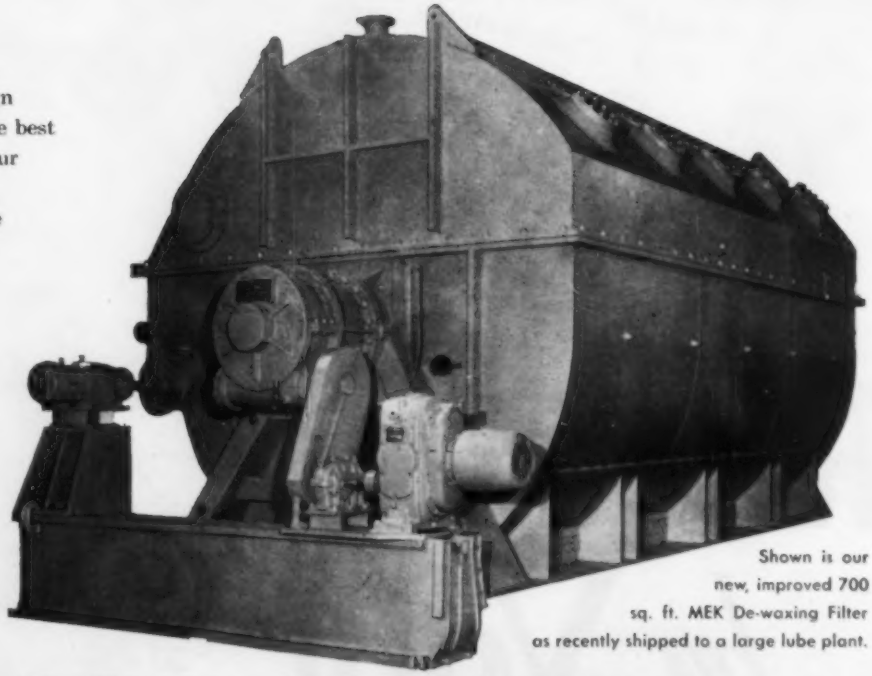


To fit your requirements!

Goslin-Birmingham manufacturing and design know-how assure you the best de-waxing filter to fit your requirements, whether for the MEK or propane process. G-B has the engineering and fabricating experience gained in the manufacture of more de-waxing filters than any other producer . . . by many times the largest volume in the industry.



Shown is our new, improved 700 sq. ft. MEK De-waxing Filter as recently shipped to a large lube plant.

Call or Write G-B for engineering consultation at no obligation.

GOSLIN-BIRMINGHAM MANUFACTURING CO., INC.

BIRMINGHAM • ALABAMA

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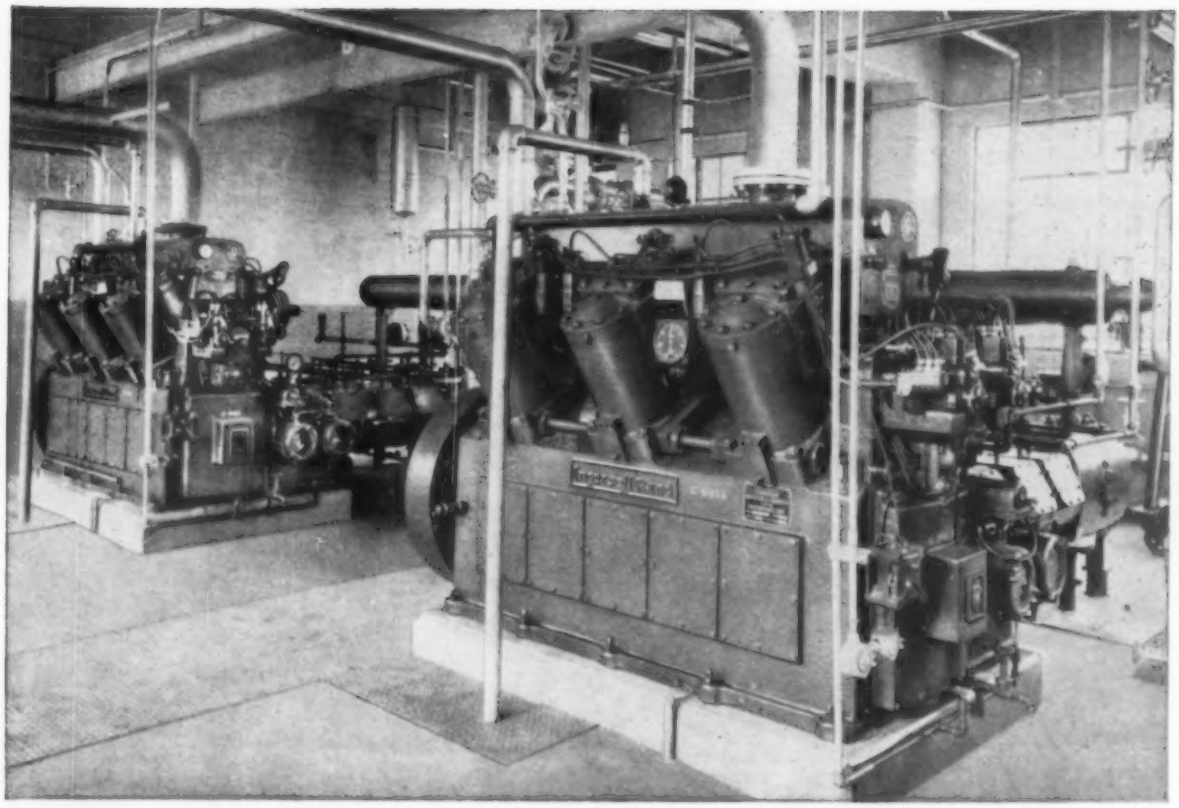


Where a lube-oil plant couldn't use its own product

Although Imperial Oil Limited's new Edmonton (Alberta) plant produces 70,000 gallons of lubricating oil per day, its compressor pistons must run dry.

Of course there is no shortage of oil at Imperial, but the Hydrofining treatment process requires that hydrogen be recycled with no trace of oil being picked up. As in many other catalytic refining processes, any compressor oil carried by the hydrogen would soon reduce the effectiveness of the expensive catalyst.

To recycle the hydrogen without possibility of oil contamination, Imperial uses two heavy-duty Ingersoll-Rand JVG-NL gas-engine compressors featuring special compressor cylinders which are non-lubricated—no oil or other lubricant is used in the cylinders, so none can get into the hydrogen.* Of course, the running gear and the rugged 4-cycle engine end of each unit has oil lubrication.

The 13-million-dollar Imperial plant also employs many other products supplied by Canadian Ingersoll-Rand Co., Ltd., including stationary compressors (with gas-engine, electric, and steam drives), blowers, portable compressors and centrifugal pumps. Ingersoll-Rand builds equipment to suit your needs, too. Call your I-R representative today.

* *Ingersoll-Rand 'NL' compressor cylinders*

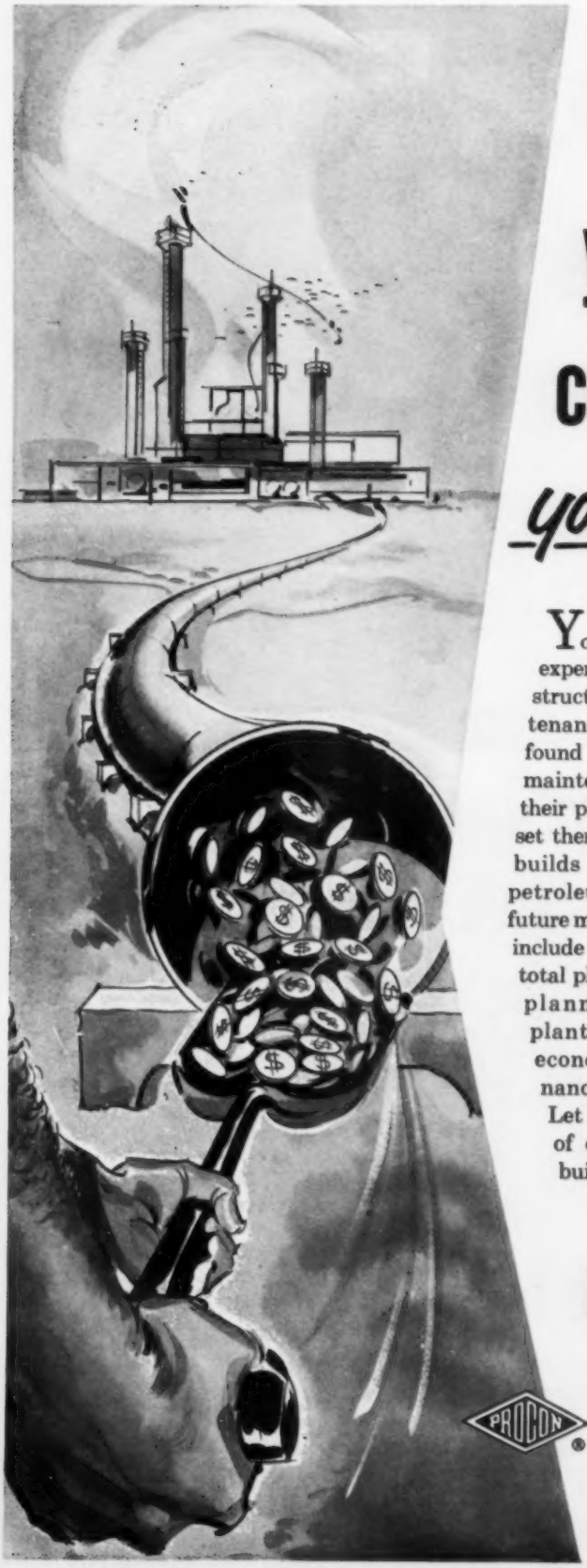
Non-lubricated cylinders are specially-built for jobs where oil-free compression is necessary. Regular oil-lubricated compressors should be used where possible because of their lower cost and maintenance, but for applications where non-lubricated compressors are indicated, the most highly-developed and successful units are NL compressors, built by Ingersoll-Rand—the pioneers of non-lubricated construction.

Ingersoll-Rand 4-CYCLE

6-473

11 Broadway, New York 4, N.Y.

COMPRESSORS • GAS AND DIESEL ENGINES • ROCK DRILLS • PUMPS • TURBO-BLOWERS • AIR AND ELECTRIC TOOLS



How much will your new plant cost.... *after you've paid for it?*

You may have learned from bitter experience that original design and construction can vitally affect your maintenance costs. Many executives have found that a big worry today is high maintenance costs, because yesterday their plant was not best planned to offset them. The way Procon designs and builds a chemical, petrochemical or petroleum refining plant helps keep future maintenance costs low because we include evaluation of the economics of total plant operation and upkeep in our planning. There are Procon-built plants all over the world operating economically today on this maintenance-minded construction principle. Let us show you how ease and economy of operation and maintenance can be built into your plant.

PROCON *Incorporated*

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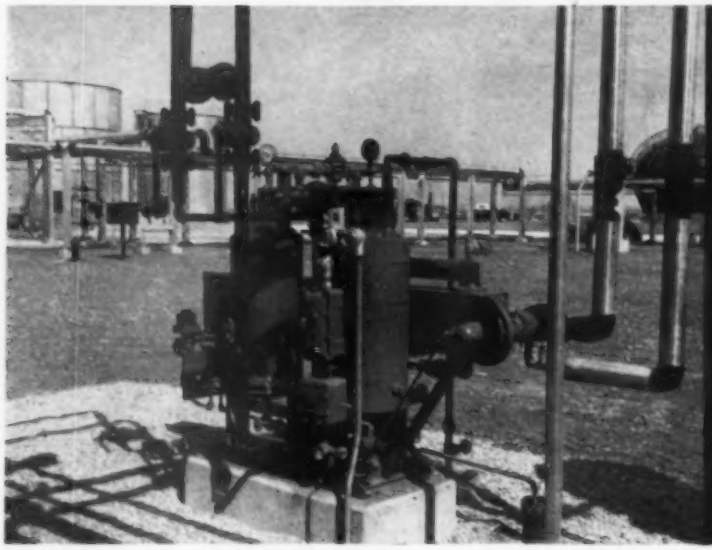
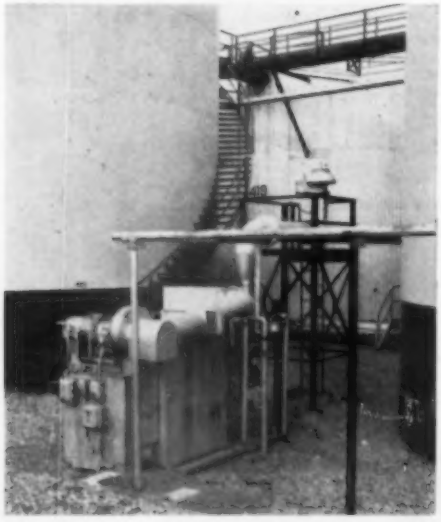
WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL, AND CHEMICAL INDUSTRIES

Works in all kinds of weather to make you independent of it



Type BWG Lectrodryer DRYing instrument air at a refinery

Lectrodryer



A blanket of DRY air is maintained over fine oils held in storage here

Lectrodryer makes you independent of moisture problems often traced to the weather. Yet a Lectrodryer is so dependable it can be set out in the weather. And it goes right on removing unwanted moisture from air, gases and organic liquids.

Generously designed and constructed, Lectrodryers handle the moisture-removing loads for which they are recommended. No cutting corners on materials. No skimping on capacity to meet a price when jobs are figured. You can depend on Lectrodryers for efficient DRYing.

The booklet *Because Moisture Isn't Pink* tells how others are employing DRYing. For a copy, write Pittsburgh Lectrodryer Division, McGraw-Edison Company, 334 32nd Street, Pittsburgh 30, Pennsylvania.

Registered Trademark U. S. Patent Office

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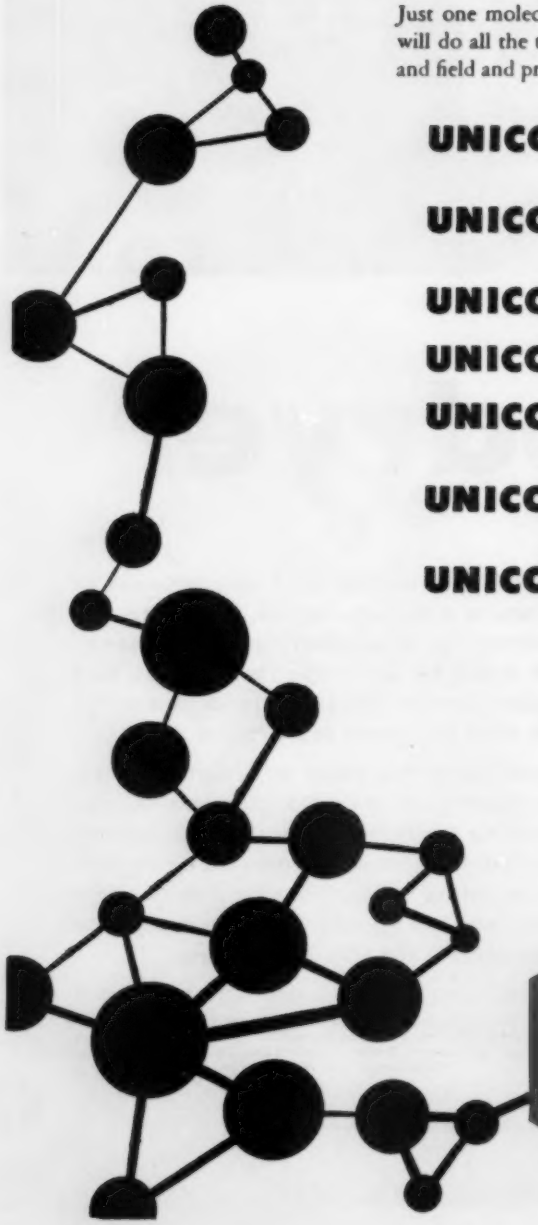
1 in a million!



Just one molecule of Unicor to one million molecules of pipeline product will do all the things listed below. Unicor has been tested in both laboratory and field and proved to be superior to any other form of corrosion preventive.

UNICOR® prevents both aerobic and anerobic corrosion. Your tanks, vessels and pipelines are protected whether full, half-full or empty.

UNICOR is oil soluble and eliminates need for addition of destructive water. It prevents rusting caused by unavoidably entrained or dissolved moisture.

UNICOR is slime-detergent and anti-fouling. The water-repellent film it forms on pipe interiors sheds corrosive droplets.

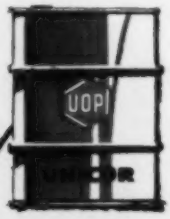
UNICOR cuts downtime to a minimum, reduces filter replacement and the use of scrapers by at least one-half.

UNICOR will not interfere with action of other useful additives such as tetraethyl lead, antioxidants and dyes. It is approved for use in Air Force and Navy jet plane fuel.

UNICOR is added at only one point. Its beneficial effect will extend to pipelines, storage tanks, tankers . . . even to consumer equipment when added at the refinery.

UNICOR is economical, costing only about $0.001 per bbl. of pipeline product. It has been approved for use in common carrier pipelines.

Sold exclusively by Universal Oil Products Company. For samples and information, write to:



UOP® UNICOR

PRODUCTS DEPARTMENT

UNIVERSAL OIL PRODUCTS COMPANY

30 Algonquin Road
Des Plaines, Illinois, U.S.A.

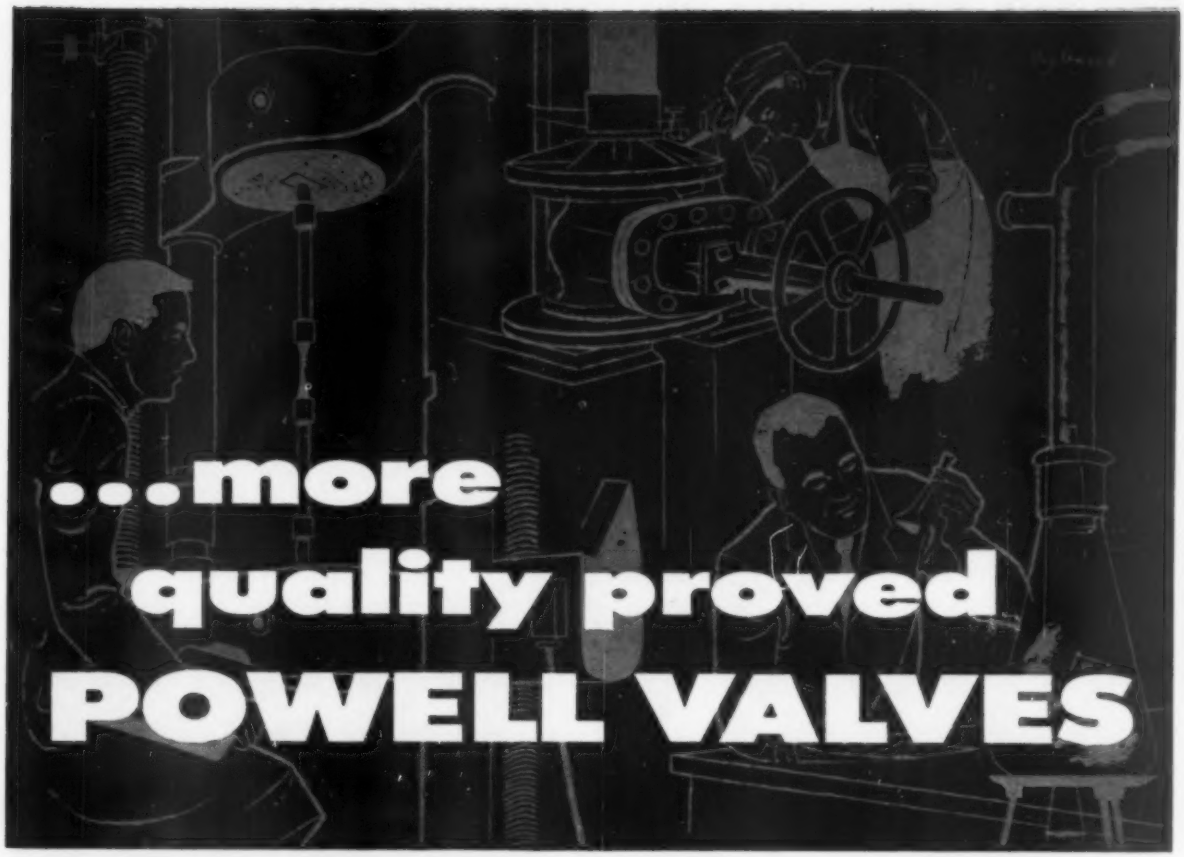
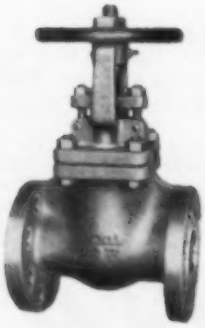


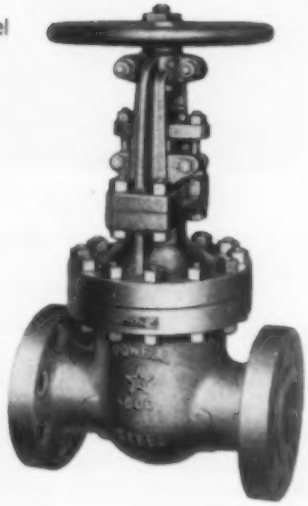
FIG. 375—Bronze "White Star" Gate Valve for 200 pounds W.S.P.

FIG. 2467—Stainless steel O.S. & Y. Gate Valve for 300 pounds W.P.

FIG. 6003—600-pound Steel O.S. & Y. Gate Valve

FIG. 3061—300-pound Steel Swing Check Valve





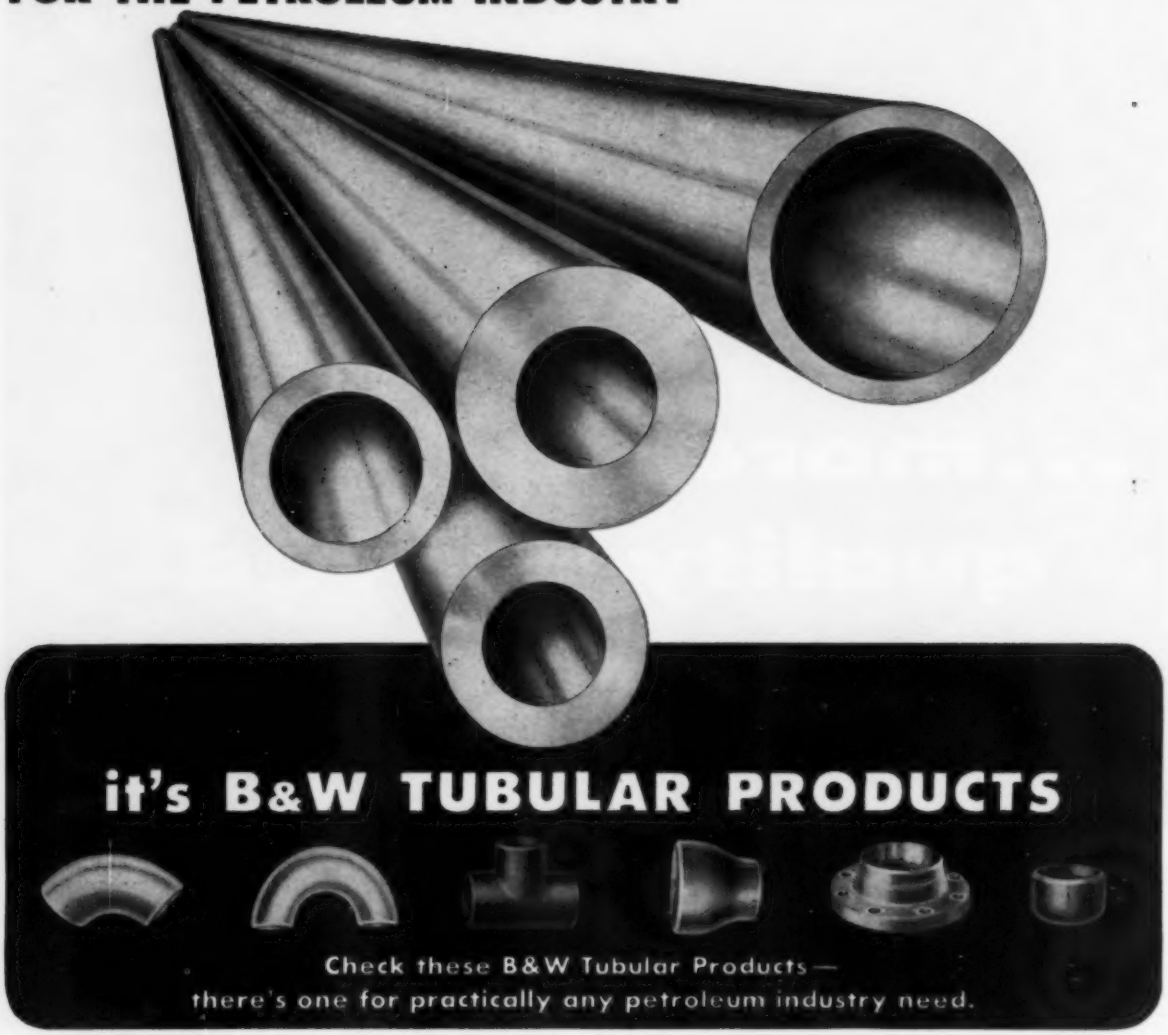
for dependable flow control

Consult your Powell Valve distributor for full facts about quality proved bronze, iron, steel and corrosion-resistant valves. For every flow control problem—there is a Powell Valve to solve it.

THE WM. POWELL COMPANY, CINCINNATI 22, OHIO . . . 111th YEAR

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD

FOR THE PETROLEUM INDUSTRY



- **Heat Exchanger Tubing**
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Available in seamless or welded; hot finished or cold finished; carbon, alloy or stainless steel or titanium metal; sizes to 9⅝" O.D.; round, square or special shapes.

- **Seamless Welding Fittings**
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Available in carbon, alloy or stainless steels; complete size range.

Write for Bulletin TB-417 "B&W Tubular Products for the Process Industries."

It takes an expert to specify the optimum tubular product for any particular application, and there is no substitute for the kind of experience with these problems you'll find at B&W. Get the benefits of B&W's long experience in matching tubular products to application requirements. Call on Mr. Tubes at your nearby B&W District Sales Office.* He can help you. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

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KEY® RETURN BENDS– KEY-KAST FITTINGS in service at new Tidewater refinery

In Tidewater Oil Company's giant new Delaware Refinery, where "firsts" are commonplace, and "world's largest" describes many of the units, KEY products were chosen for their efficient, economical, long-lasting service.

The furnaces are equipped with KEY 5000 Type Return Bends. Their simple design, rugged construction mean dependable service. Only 26 parts for 18 different size fittings in two series mean substantial savings in inventory. In addition KEY 180° type "W" welding fittings were extensively used.

KEY-KAST alloy steel welding fittings in ells, tees and caps were furnished in schedules 40 and 80, sizes from 16″ to 24″, in low chrome moly steel.

KEY Return Bends and KEY-KAST fittings are bringing dependability and economy to refineries throughout the world. Specify KEY and KEY-KAST products for your next job.

KEY PRODUCTS SPECIFIED FOR TIDEWATER REFINERY

KEY 5000 Type Return Bend (PATENTED)

KEY-KAST 90° Elbows

KEY-KAST Tee

KEY-KAST 180° Return Bends.

570

KEY Products on this project were supplied to

C. F. Braun & Co. • The Lummus Company
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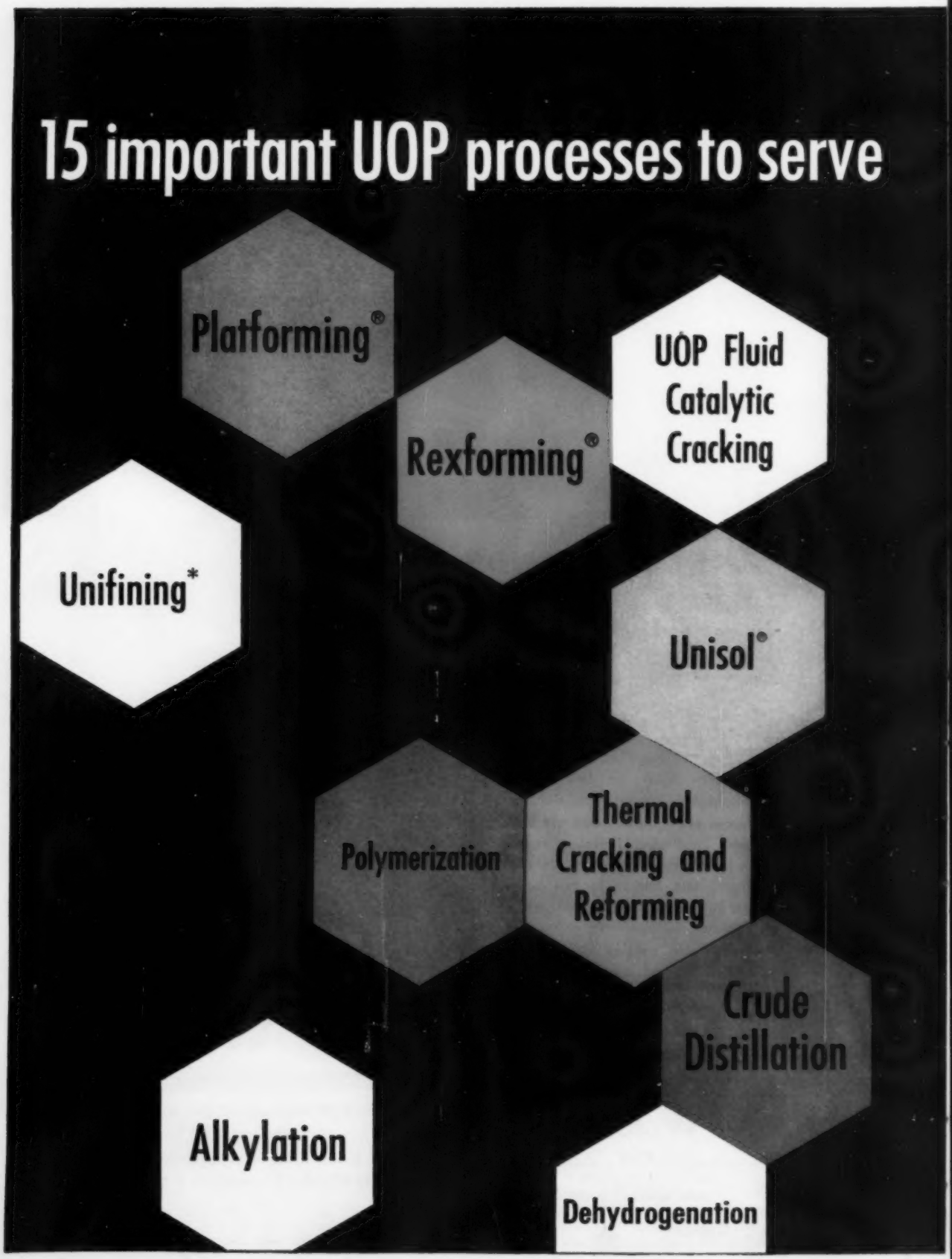
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The names displayed here identify some of the most widely used and best known refining and petrochemical processes made available to the entire petroleum industry by Universal Oil Products Company.

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Many Small DEVELOPMENTS Loom Large

Arch L. Foster
Refining Editor

THE field of tools, of materials required to implement the modern refinery and petrochemical or natural gasoline plant currently resembles a brick wall — innumerable small items collectively make a very large assembly.

One of the outstanding developments in recent years is that of instrumentation and automation of processes. The invention, design and application of a mob of new instruments are revolutionizing plant processing and control. These developments came in response to increasingly imperative needs for closer control of operations and thus improved product qualities for more efficient use of raw materials, more profitable products, lower losses and operating costs — for higher percentage calendar time onstream, i.e., higher run efficiency.

Strangely enough, as was the case for catalytic processes, and most others, top management had to be sold on the use of instruments — had to be shown that a "machine" could do a job better than any human workman. Eventually management accepted the advantage of individual instruments, generally simple recorders drawing a curve on a chart. This stage was a far cry from the current integrated instrument systems, with a titular head, working groups, repair shops, "trouble shooters," and the systematic routines for choosing, purchasing, installing, operating and maintaining the myriad of instruments of today.

More recently has come into vogue the INSTRUMENTEER, the overall general executive manager of a large plant's entire instrument system. Before that official could function as head of a separate department, management was sold on the pay-off for such systems. Instrument engineering was developed, at least in embryo, and the direct advantages to be so obtained must become real and visualized. Each type of instrument was studied, largely independently, to find out how a central organization could handle, repair and maintain each type. And the biggest problem of all was to develop instrument engineers, and to formulate methods to be used to handle the company's instrument problems. Suitable employees had to be shown that the instrument department is an excellent avenue for "getting ahead" with the company, and offers opportunities for the employees to climb to something better.

Engineering of instruments to the point of being a science was the development of almost a generation. The INSTRUMENTEER'S job has been to assemble and correlate all these developments, whip the whole field into shape so that supervisors, technicians and engineers can be trained in the instrument field.

Repair shops, workshops must be developed and laid out, provided with machines and equipment to carry out all sorts of repairs, of rebuilding. In innumerable cases shopmen must be trained to adapt parts to purposes for which they are not designed; to make up, on lathe, milling machine, and handworking bench spare parts that are not on hand, and for which the plant unit cannot wait until the supply warehouse can forward the essential part. Normally the foreman of such a shop may be a well-experienced machinist, in addition he should have instrument experience, either in repair shop or plant.

Developing the entire instrument *organization* may go hand-in-hand with the design of the instrument *system* in a plant under design. It is simpler and more efficient also to plan the instrument system while the plant is being designed than to install many or all the instruments after the plant is built. The major portion of the staff may well be selected from youngsters — fresh from school, technical or general high schools or from instrument groups of other plants. Graduates of special training classes taught by instrument men, with plant personnel as students, make up some of the best material for the department staff.

One great problem is to teach supervisors the peculiarities of instrument behavior, so that they can trace the trouble to its source, find out what to do, and decided if the problem is a process variable, or is traceable to the instrument's malfunctioning.

One phase of the instrument technician's education is to gain a knowledge of plant processes, some basic knowledge of chemistry and engineering, and the ability to think in terms of automation. He must realize that just keeping an instrument running up to its standard is not enough — it must always be made to operate better than before.

One of the incidentals, in one sense extra-curricular activities of the instrument engineer, of any rank, especially those with large plant experience or chemical engineering training, is to aid the operating and management personnel in solving process problems, over and above his specific job's demands. Often the difference between a poor operation and a proper and satisfactory one that yields a top-quality product is a matter of closer control, and the chemical engineer-instrumenteer may be able to contribute greatly to the most successful solution of the problem.

Equipment — New and Newer

Of the new departures in equipment and materials within the last year or two, "the number is legion." A new turbine meter, the Pottermeter, has replaced in one installation eight positive displacement meters, and after measuring 4 million bbl at a rate of ½-million bbl per week, showed no visible signs of wear. A cooling tower designed specifically for air conditioning and low-cost industrial use, with low initial operating and maintenance costs shows its superiority for removing heat. A new method for treating

cooling tower lumber (Marley) is showing good results and consists of saturating the wood with various combinations of water-soluble toxic compounds that penetrate the wood to form essentially insoluble compounds which are deadly to fungi.

A new line of hot oil pumps (Dean) that handle liquids from minus 200 F to 850 F and up to 675 psig and are equipped with water-jacketed stuffing boxes that use either regular packing or mechanical seals, so designed that the box is cooled without affecting the fluid handled by the pump. Another new unit is a vertically split centrifugal that is designed for up to 850 F temperatures, 600 psig, that can be supplied (Worthington) in special alloys for corrosive conditions.

A more rapidly reacting inhibitor-sweetener is UOP's 5-S that gives all the advantages of the old No. 5, but contains a catalyst that speeds up the oxidation of mercaptans to disulfides and thus removes odor, and completes the reaction within one-fourth to three-fourths of the time required with No. 5.

A new Hot-Lime zeolite system for treating boiler waters has been developed (Cochrane) that includes two-stages of softening with a filter step between. The whole thing is controlled automatically from a central panel. Use of dolomitic lime takes out some silica; sludge is recirculated to give better precipitation.

A Rust-and-Scale removing detergent that removes these materials from heat exchangers and condensers in one soaking operation (Oakite) speeds up and makes more efficient this all-important aid to greater unit efficiency. Improvement in efficiency of up to 250 percent has been attained with badly encrusted bundles.

Two new process pumps, one grease-lubricated and one oil-lubricated are being introduced (Peerless) for chemical and other plant use, on pumping heads of 400 ft and volumes up to 800 gpm. Practically all components are interchangeable, which enables the user to assemble a complete pump in his own plant, from parts.

One of the innumerable developments in accessories and parts is a new line of Teflon hose, usable in temperatures from minus 100 to 500 F, for handling organic acids such as acetic; inorganics such as chromic, hydrofluoric, nitric, sulfuric and many others. Fittings are provided in carbon steel and many alloys.

The gas turbine is exhibiting great versatility in the refinery and similar plants. It has a double role; it drives blowers and compressors very economically indeed, or can generate electrical power at low cost. Then, hot air from it can be used as preheated air in fired boilers, can be passed through waste-heat boilers, or can be employed to burn CO in such steam generators. Other uses to which the hot air stream can be put is for butadiene making, catalyst regeneration in cat crackers and reformers, and a wide range of processes in petrochemical manufacture.

Among other new products that may be mentioned is the use of high current density welding units (Air Reduction) to cut, in a multitude of shapes and forms, all sorts of non-ferrous metals for all sorts of purposes. A special relief valve for pressures up to 150 psig employs a piston that has high capacity and such simple design that one man can field-maintain it with ease. A new paraffin-treating chemical (Brakesol) can be used to incorporate paraffin in tank bottoms back into crude oil and thus to carry through pipeline and processing units by simply suspending the paraffin in the crude, a routine that saves paraffin and cuts the cost of tank cleaning. Inaccuracies in metering chemicals can be reduced by the use of a new type relief valve (Milton Roy) equipped with ball-checks in the valve body. These valves are checked and calibrated at the factory for given pressures that are stamped on the valve.

Clarification of especially finished products is obtained economically with a Fuller's earth filter unit (Ronningen) to remove the earth carry-over from a standard filter operation. A new miniature recorder (Honeywell) offers great advantages in accuracy, ease of installation and low upkeep trouble for all types of recording service. ★ ★ ★

The latest lines in . . .

Refining Equipment

Rundown on new products and services keynotes advances in refining, petrochemical and gas processing

INSTRUMENTATION and CONTROL

Device Identifies Molecules

250 An optical-electronic device that aids quick and accurate identification of chemical structures has been placed in operation by California Research Corporation, research subsidiary of Standard Oil Company of California.

This new research tool, the Cary Model 81 Raman spectrophotometer, is the only one of its kind in the world.

Named for Sir C. V. Raman, the Indian scientist who first observed that molecules scatter light and re-emit it at different frequencies, the device records the extremely weak radiation emitted by molecules on a strip-chart, with a pen and ink system.

The new method represents a major departure from the old photographic process of determining chemical structures. Principal drawback of the previous system was that variations in film and developing procedures hampered accurate measurement of the relative intensity of spectrum lines.

Built by Applied Physics Corporation of Pasadena, California, the new instrument has cut time of operation from 6 hours to 10 or 15 min in some instances.

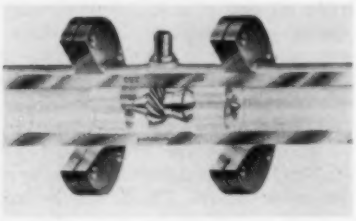
Mr. A. L. Lyman, president of Cal Research, said increases in speed and accuracy are expected to provide valuable information on a wide variety of problems associated with high octane gasoline, lubricating oil fractions and numerous petrochemical products and processes.

Standard Oil Company of California

Turbine Meters Oil Flow

251 Petroleum pipeline, tank car and barge loading, and refinery engineers have discovered the Pottermeter, a high-accuracy and wide-range, turbine-type flowmeter. In one pipe installation a single 6-in. Pottermeter covers a wide flow range, replacing in one case 8 bulky positive displacement meters. Easily placed in any size line, the flanged unit is made of stainless steel and requires a minimum of maintenance.

The 6-in. unit mentioned above was taken out of the line for examination after metering 4 million bbl at a rate of



about 500,000 bbl a week. Inspection revealed that there was no visible wear.

An alnico magnet embodied in the core of the rotor generates a pulse in an externally mounted pick-up coil. This pulse is directly proportional to the flow and is used to activate remote indicating, recording and control instruments.

For 10 years the Pottermeter has been standard in the measuring of fuel flows in rocket and jet engines. Made in diameters ranging from ⅛ to 12 in., the secret of the instrument's low maintenance lies in the fact that it requires no thrust bearing due to its unusual ability to automatically assume at once a position of hydraulic balance. Pottermeters measure oil flows of 30,000 bbl per hr and more with consistent high accuracy and at pressures to fit any specification.

Potter Aeronautical Corp.

Tubeless Regulator Guards Controls

252 With the trend toward greater automation and increased dependence upon electricity in modern refinery and petrochemical processing equipment, problems created by voltage fluctuation can prove to be extremely costly unless corrected. Faithful performance of delicate sensing instruments and of unattended control mechanisms rely heavily on operation at nameplate rating. Any variation in this rating causes a sacrifice either in life or performance of the equipment. Even minor voltage fluctuations applied to automatic control devices can nullify the most costly engineering and design investment and can cause processing damage or down time worth many times the cost of proper automatic voltage regulation equipment.

Many annoying troubles cannot be easily traced but are often the result of either overvoltage or undervoltage variations. For example, a 10 percent undervoltage results in a 19 percent decrease in starting and maximum running torque of induction motors, drastic reduction in electronic tube life, sluggish solenoids and timers that result in process recycling. A 10 percent overvoltage results in a 10 to 12 percent increase in induction motor starting current and a 20 percent reduction in corrective capacity of capacitors thereby losing the benefit of 20 percent of the capacitor investment.

A complete line of Stabiline Automatic Voltage Regulators are available for industrial or laboratory applications. Stabilines Type TM (tubeless magnetic) provide a constant output voltage regardless of line voltage or load changes and are especially well suited to the petroleum industry. Containing no tubes, transistors or moving parts, they can be used in remote applications where little or no attention is possible or for critical process applications where malfunction or replacement can be costly.

For loads up to 1.0 kva unit is offered in cabinet or rack models. For loads to 3.0 kva and 5.0 kva units are wall or rack mounted. Both input and output connections are made solid to the terminal board inside the cabinet.

The electrical ratings for these types are input: 95-135 volts, single phase, 60 cycles ±5 percent; output: 115 volts nominal, adjustable from 110-120 volts; accuracy: 1-v band for line voltage variations and/or load magnitude and power factor changes; waveform distortion: 3.5 percent maximum on TM7101 and TM7103, 4 percent maximum on TM7105; response time: less than ½ second for ordinary line and/or load changes; power factor: 0.5 lagging to 1.0. Units for 230-v service will be available soon.

The Superior Electric Company

Control Operator For Special Uses

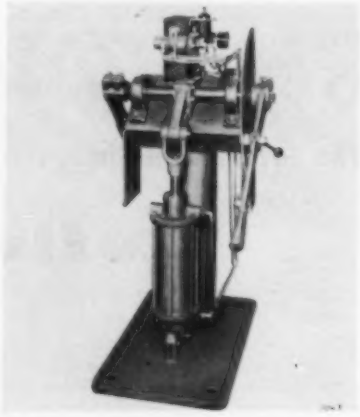
253 A new line of pneumatic drive units, which may be adjusted with linear, square, or square root characteristics, or may be field characterized for special applications, has been developed by Copes-Vulcan Division, Blaw-Knox Company. It is designed to position such control devices as butterfly valves, control valves, dampers, louvers, rheostats, vanes and variable-speed drives by remote automatic or manual pneumatic signals having a range of 0-20 psig.

The totally enclosed drive units come in the following sizes, torque ratings and weights:

MODEL	SIZE, INCHES Bore	Stroke	TORQUE RATING 80-Psig Air Supply Nominal	Stall	NET* WEIGHT Pounds
4x8	4	8	265 ft-lb	380 ft-lb	280
6x8	6	8	500 ft-lb	830 ft-lb	315
6x12	6	12	610 ft-lb	1280 ft-lb	480
8x8	8	8	850 ft-lb	1410 ft-lb	350
8x12	8	12		2110 ft-lb	540

*Complete with cover

Drive unit combines a positioner, a 4-way valve, a power piston and a feedback cam into one integrated, compact system. In the pneumatic circuit, the positioner supplies air pressure to operate the 4-way valve, which is in balance when feed-back position balances pneumatic demand. Positioner output



is then stabilized at approximately 9 psig, null-balance point of the 4-way valve. Any plus-or-minus deviation from 9 psig determines both magnitude and direction of drive-unit movement by exhausting one side of the power piston and increasing air loading on the other side.

Also available are such optional accessories as mechanical or pneumatic stops, limit switches, position indicator, position transmitter, connecting linkage and automatic air lock with either automatic or manual release.

Copes-Vulcan Division, Blaw-Knox Company

Spectrometer Features Simplicity

254 Problems of analyzing extremely small amounts of gaseous mixtures, or liquids capable of being vaporized, can now be solved with a new, inexpensive, portable mass spectrometer designed for both laboratory and industrial use.

Known as the Type 21-611 Mass Spectrometer, it is a precision instrument developed for medical, industrial, and university applications. This versatile unit permits industrial engineers and research scientists to perform precise batch or process analysis in the field or in the plant. The over-all mass range of the instrument is from 2 to 80 with resolving power adequate for separation of adjacent peaks up to about mass 35.

It possesses a unique and improved scanning feature. Mass numbers appear linearly with time on a large, motor-driven dial, making mass marking unnecessary. In a conventional mass spectrometer, peaks are recorded far apart in the low mass range and close together at the high end. In this unit, mass numbers appear equally spaced on a fixed time base. A manual over-ride on the motor drive permits the operator to turn quickly to any mass number of interest, or to start and stop the automatic scan at any desired point.

A metal rotary valve makes batch sample introduction a simple, routine operation. Errors in settings cannot damage unit, thus permitting inexperienced personnel to operate it.

Its high sensitivity makes possible the detection of gas impurities in the low ppm range.

Mass spectrometer weighs only 115 lb. It is suitable for bench, rack, or trailer mounting, with the analyzer and control modules either stacked or separated.

Consolidated Electrodynamics Corporation

Relief Valves Are Leakproof

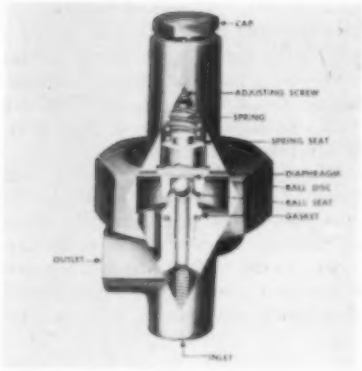
255 Inaccuracies in chemical metering are usually due to improperly operating and leaking relief valves. During extensive field studies, it was found that leaking relief valves actually stole accuracy from chemical feeding systems. No matter how accurate controlled volume pumping was, inaccuracies persisted. To correct this condition, a relief valve was developed by the Milton Roy Company, which provides tight shut-off below set pressure — without leakage.

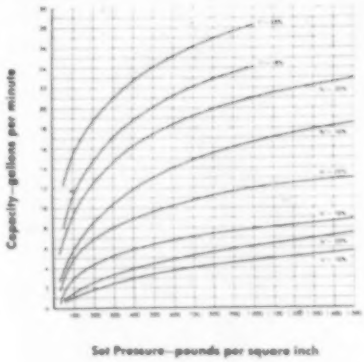
Designed with ball checks in the valve bodies, these relief valves are snap-acting and non-chattering. They are engineered and constructed for use with controlled volume pumping of corrosive liquids and operate at pressures up to 1500 psi. At pressures under 300 psi, they provide high volume relief of unusually large capacities. Ball checks assure fully opened or tightly closed performance.

Operation. In operation, the line pressure acts against the ball check equivalent to the cross sectional area of the ball seat. The resulting force is opposed by spring compression. Whenever the line pressure reaches the set value, the ball check rises from the seat. The line pressure acts immediately against the larger area of the diaphragm creating a force which pops the valve wide open. After the pressure is relieved to the point where the force on the diaphragm is insufficient to hold it open, the valve then snaps shut.

All relief valves are factory-tested and calibrated at set pressures (stamped on each valve). A wide range of pressure settings, however, are obtainable from each valve, and can be changed in the field with a screw driver without removing the valve from the line. Internal parts are replaced or cleaned easily.

Back Pressure Valve. A back pressure valve, similar in design to the Milton Roy Relief Valve, is also available





for chemical feed systems where the process pressure is below suction pressure of the controlled volume pump. These valves can be used with maximum pressures to 200 psi. In effect, they are automatic pressure regulators for handling corrosive liquids.

A Kel-F or Teflon diaphragm protects the top works from contact with corrosive chemicals. To assure long service life, valve body components which come into contact with these liquids are constructed of steel, 316 stainless steel, Carpenter No. 20, Hastelloy C or Hastelloy B. Available in ¼, ½, ¾ and 1-in. standard sizes.

Milton Roy Company

Measures Strains at Temperatures to 1000 F

256 A new optical strain gage capable of measuring strain characteristics of materials subjected to temperatures up to 1000 F, has been developed by American Instrument Company. Aminco-Tuckerman Optical Strain Gage is designed for the precise measurement of tension and compression strains as small as 0.000004 in., and in such varied materials as metals, brick, stone, concrete refractories, plastics, and many other materials.

Gage consists of 2 essential parts: The auto-collimator and the extensometer (or gage).

Strain being measured is manifested by a rocking of a mirror within the extensometer. The degree of rocking is then measured by the auto-collimator. The auto-collimator need not be mounted in a fixed relationship with the extensometer or at any fixed distance from it.

Any number of extensometers can be used and either flat or cylindrical specimens may be tested.

American Instrument Company, Inc.

Instrument Valve Combines Advantages

257 Welding advantages of carbon steel and seat wear characteristics at least equal to stainless steel are combined in a new line of high temperature instrument valves.

Wearing qualities are improved over those of earlier carbon steel designs by incorporation of an integral seat insert of chrome-cobalt-tungsten alloy (arrow). As the body of the valve is carbon steel it can be welded into carbon steel piping with ease and efficiency not

possible with a stainless steel body. Screwed ends are also available.

Rated at 2500 lb at 850 F, the new valves have drop forged steel bodies and yokes and swing bolted glands for easy repacking. Precise flow control required for power plant instrumentation and similar applications is provided by a tapered needle point stem disk and fine pitch screw threads.

The new line has been adopted as successor to previous carbon steel instrument valves. Stainless steel body line will continue in production for applications requiring extreme corrosion resistance.

Edward Valves, Inc., subsidiary of Rockwell Manufacturing Company

A Single Point Thermometer

258 Here is a new concept in thermometry! For the first time, W. C. Dillon & Company, Inc. is making available a custom calibrated bimetallic thermometer.

Unlike standard thermometers encompassing a wide temperature range, this new unit is calibrated for absolute 100 percent accuracy at any single desired point between −40 and 1000 F. There has long existed a need for a thermometer which would be dead accurate at a particular specified point and where other markings on the dial would best be eliminated to prevent confusion. Dillon Custom Calibrated instrument provides the ultimate in easy reading with its single calibration point. A notarized certificate of calibration is furnished with each instrument showing actual date of calibration and attesting to 100 percent accuracy.

W. C. Dillon & Company, Inc.

Transmitter Is Pneumatic and Linear

259 A departure from conventional speed transmitting devices, the new Foxboro Type 16A Pneumatic Speed Transmitter, produces a pneumatic output linearly proportional to rotational speed. It will measure the speed of any rotating machinery and is particularly applicable to turbines, conveyer lines, compressors and other rotating equipment.

Transmitter operates on the force balance principle with magnetic actuation of a standard pneumatic circuit. Connected to rotating equipment, the transmitter input shaft spins a multipole permanent magnet, rotating a magnetic field through a non-magnetic disc close to the magnet poles. Disc, with a force bar attached, tends to rotate in the same direction as the magnet, positioning the bar in relation to an air nozzle. Resulting back pressure in the nozzle circuit, amplified by a relay, exerts force, through a free-floating ball piston which bears on the force bar, to balance the torque produced on the disc by the rotating magnet. This 3 to 15 psig feedback pressure is received by an indicator, recorder or controller calibrated in units of speed.

The transmitter is small, light and easily installed. Gasketed construction and continuous air bleed prevent dust and weather damage. No electrical hazards are present. The effect of ambient temperature on magnetic field strength is compensated by the bimetallic input shaft which automatically varies the spacing between magnet and disc with temperature changes.

Transmitter range is adjustable from 0 to 1600 rpm up to 0 to 2400 rpm by a fine range adjustment screw and extended to 0 to 320 rpm through 0 to 5300 rpm by optional speed changers.

The Foxboro Company

Safe Way to Handle Acids

260 Sulphuric acid is a hazardous chemical to handle and any precautionary measures taken to safeguard those involved cannot be too extreme. It is now possible for industries to avoid costly lost time accidents if a special acid dispensing system developed by Proportioneers, Inc. is installed at dispensing points. This low cost, safety equipment provides for the automatic and/or continuous dispensing of acids without subjecting the op-

erator either to contact with the acid or exposure to its fumes.

In the installation, acid carboys are delivered to the cement pad outside the building.

A keyed switch must be actuated before acid is dispensed, preventing unauthorized personnel from operating the dispenser. As a second precautionary measure, a foot switch must be actuated before acid is dispensed.

Dispenser has an adjustable capacity of ½ to 8 gal per hr. The feed rate may be adjusted while the unit is in operation by turning the feed rate adjusting knob on top of the feeder. The 3-step cone pulley V-belt drive gives adjustment of stroking rate for a wider variation of the feed rate. Feeder is operated from inside the building.

The dispenser has a Hypalon pumping diaphragm. This feature entirely eliminates the stuffing box leakage common in plunger pumps.

Proportioneers, Inc., Division of B-I-F Industries, Inc.

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Tips to Save You Money When...

Specifying and Procuring Towers

MARSHALL ROACH *Project Engineer; The Pfaudler Company, Rochester, New York*

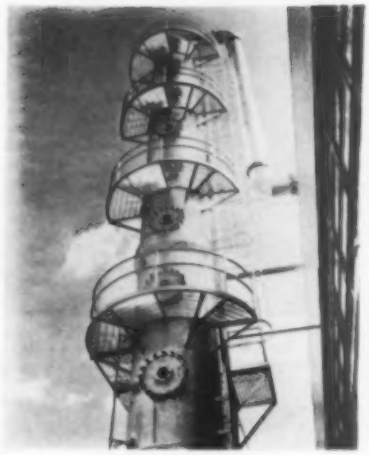


FIG. 1. There are two types of tower manufacturers... those building to **mechanical specifications** and those who design and build to **performance specifications.**

COLUMNS or towers are one of the most expensive items of equipment in a chemical plant or refinery. While primarily associated with unit operations such as distillation, absorption and extraction, column type vessels are finding increased acceptance as continuous reactors for processes including alkylation, chlorination, and polymerization.

For all applications, careful attention to specifications and design will assure you a sound column investment. Here is a highlight review of what is available, together with practical money saving pointers on specification and procurement.

Selection of Column Type

Basically, columns consist of a cylindrical shell within which are various types of fixtures designed to promote contact between two or more material phases. These fixtures, or internals, may consist of trays or plates, packing of various shapes and sizes, or spargers and spray nozzles. Majority of columns are either of the tray or packed type.

Among plate types, the bubble-cap design is the most important. In general, this type column is always used for systems requiring a wide capacity range and are also used where service is slightly fouling, where the diameter of required packed column is very large, where the reflux ratio is very low or very large, or when small size and light weight are important.

Perforated or sieved trays are finding increased application. This type column permits greater capacity than can be obtained with bubble trays of the same diameter. Efficiencies also are reported to be higher within narrower capacity ranges. Sieve trays find their greatest application in fouling and corrosive services where ease of cleaning and low replacement cost are important. However, they are not recommended for foaming or high vacuum services. Foam lowers their efficiency, and since a minimum liquid level of about 2 in. must be maintained on the trays, they have a higher minimum pressure drop per tray than either the bubble tray or Turbogrid.

The Turbogrid design, unlike the bubble cap and sieve types, normally does not include downcomers for the liquid phase. Downflow of liquid and upflow of vapor take place through the same slot type openings in the trays. The trays are simple, flat plates covering the entire internal cross section of the column. Savings made possible through simplified design and reduced column diameter for a specified capacity make this design less expensive than either bubble tray or sieve tray columns. One objection to the Turbogrid tray is its relatively narrow capacity range. However, if the load changes are predictable in advance, this is not too serious as the slots can be blanked or opened to vary the tower capacity. Of course, this must be done during a shut down.

More recently, new designs of bubble trays have been introduced, including the Kaskade, Uniflux, and Float valve trays. The Kaskade was first used commercially in 1953, but was slow in establishing itself as an accepted design. As its name implies, liquid cascades down steps across the tray with vapor passing under the cascade. The Uniflux tray is somewhat similar to the tunnel or rectangular cap trays. With this design, however, the caps are not distinct from the trays. A series of "S" members form both tray and cap. Bubbling takes place on only one side of the tunnel. The Float valve bubble tray, like the Kaskade, is a more radical departure from the bubble cap design. Briefly, it consists of a slotted deck with the slots covered by L shaped bars. These bars are free to move vertically until restrained from further movements by end brackets. The leg of the L makes one edge heavier than the other so that at low vapor rates the light edge is lifted first; with increasing vapor rates the heavy edge also is lifted. All these designs have distinct advantages, and their use should increase at the expense of bubble cap trays.

The packed column is the oldest type and usually has the lowest initial cost, especially in the smaller sizes. For most applications, however, this type column does not provide the efficiency or flexibility offered by the bubble tray type; consequenlty, its use often is limited to corrosive services, batchwise operations, small diameter columns or where product purity may be impaired by metallic contamination. For corrosive services, packed columns can be obtained in ceramic and glassed steel construction. Their lower liquid hold-up make them more acceptable for batch operation. Also, they have been favored for vacuum distillation because of greater ease in designing for a lower pressure drop.

It is now realized that much of the inefficiency inherent in the packed type column is due to uneven liquid distribution. As a result, more attention is being given to distributor and redistributor trays, especially in the larger diameter columns.

Column Specifications

Obtaining the best column for your needs at the lowest cost largely depends on the quality of specifications submitted by you the purchaser, time allowed vendor to quote, and analysis of the bids received. Chief among the general rules on this subject are:

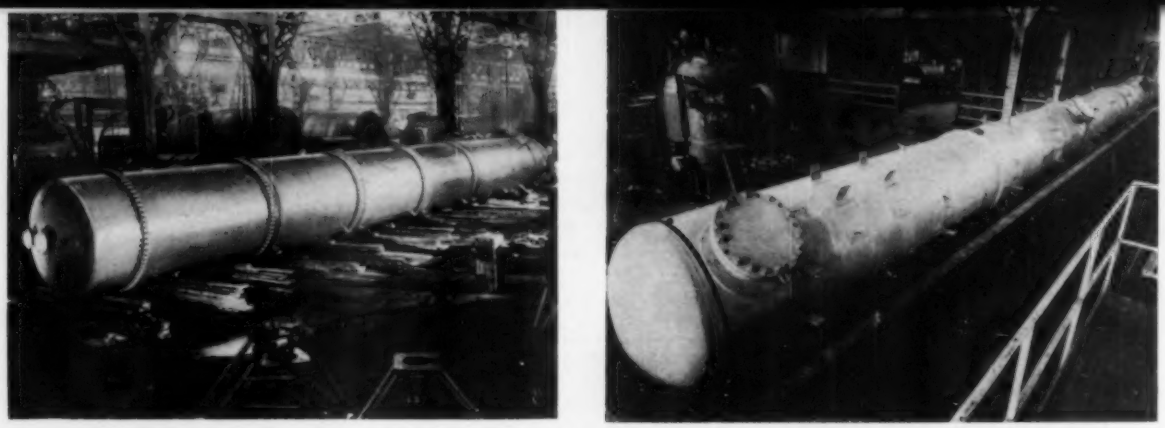


FIG. 2. Permitting manufacturer to use his construction standard or suggest improvements results in savings and better performance. Top is 66-ft glassed steel hydrogenerator consisting of eight 72-in. diameter sections and bottom is 76-ft carbon and stainless steel tower.

1. Make your specifications as complete as possible in terms of your problem, but avoid specifying non-essential details which have not been thoroughly investigated.
2. Make it possible for the vendor to use his standards or to suggest improvements in your design.
3. Allow sufficient time for vendors to do a thorough job of estimating, and
4. Give due weight to the experience, integrity and process knowledge of your bidders.

Allow at least three to five weeks for bidders to quote on a completely designed custom built column. If the fabricator is to design the column to meet performance requirements, an additional two to three weeks is required. Also, keep in mind that there are two types of column manufacturers — those who build columns to detailed mechanical specifications, and those who design and build columns to meet performance specifications. Both groups guarantee workmanship and materials, but only the second group guarantees that the column design will also meet capacity and performance specifications.

Shell Specifications. Watch details carefully omitting those not absolutely essential to the operation, safety or service life of the column. Suggestions offered by your fabricator may help to lower costs — as with these actual examples:

Case I. Fabricator asked to quote on column for which customer specified 15 psig internal pressure and also full internal vacuum. Because of full vacuum specifications it was necessary to increase shell thickness two sizes over that shown on drawings submitted. A check showed that column would not be used for a vacuum greater than 5-in. mercury. By deleting full vacuum specification, fabricator was able to quote to original specifications.

Case II. Design specifications called for reinforcement pads around the larger openings. Column manufacturer estimated this design and one using the next heavier plate size material to eliminate the need for pad reinforcement. Savings in fabricating costs by eliminating pads more than offset the additional cost of shell material.

Case III. Column originally specified as solid stainless. Check of operating service showed that clad material would be acceptable. Specification was changed and customer saved $11,500, or 15 percent of total column cost.

The economic breakpoint between solid, stainless steel and clad material depends on factors other than thickness, but since the normal minimum total thickness for clad material is 3/16 in., little or no saving can be expected when the required thickness is under ¼ in., and clad may even be more expensive at thicknesses below 3/16 in.

Unnecessary tolerance requirements also can run up the cost. These should be limited only to those necessary for successful operation of the column. If time permits, a good procedure is to have each bidder submit his standards. Occasional requoting by the two or three lowest bidders may be required before placing the order, but this practice could well result in significant savings.

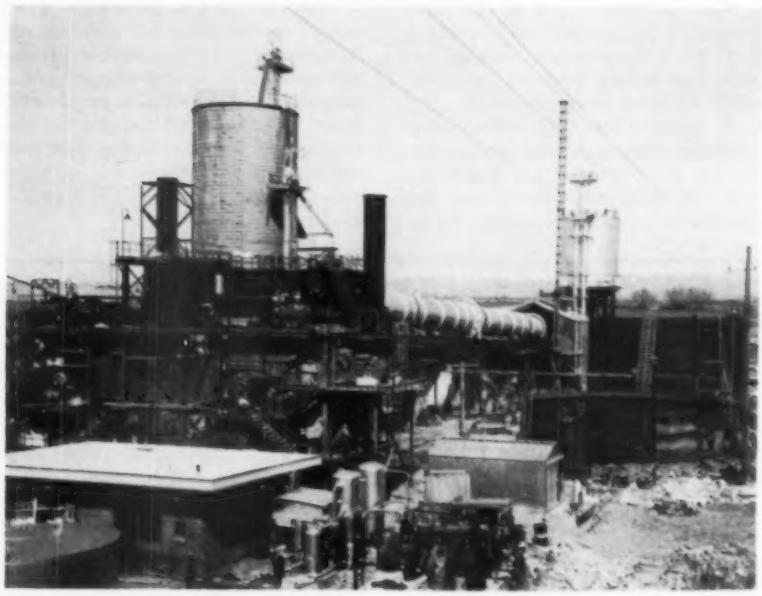
Main Flanges and Nozzles. Nozzles and flanges offer possibility for savings if fabricators are permitted to quote on their standards. Equipment manufacturers frequently are able to fabricate these items cheaper than if commercial equivalents were purchased. For example, a standard fabricated clamp joint for main column flanges (16 in. size, stainless steel) costs slightly over $125 — about one-fourth the cost of an equivalent commercial raised face welding neck flange. A single manhole extension and flange of standard design costs about $700. Its commercial equivalent, a 24-in. manhole of 304 stainless constructed from a welding neck flange plus a blind flange, costs approximately $2000.

Column Internals. Specifications for bubble tray columns often include a drawing of the tray assembly complete with details of the component parts such as deck, caps, risers, downcomers, and tray supports. The type so illustrated may meet the standards of only one or two potential suppliers, and as a result, the advantages of competitive bidding are largely lost.

Since the relative efficiencies of standard commercial bubble tray designs do not establish one design as superior to others, it is sufficient for the purchaser to specify the number and size of caps, slot area, riser area, downcomer area or tray facing. With this information, the equipment manufacturer can design the mechanical layout and method of tray support in conformance with his most economical techniques. The purchaser will receive quotations which meet process requirements, and which also represent the optimum design of each bidder. Giving a manufacturer the option of quoting his standard is particularly important when the fabricator is a specialist in that type and material of construction.

To insure adequacy of basic data, engineering fabricators request the purchaser to complete a standard questionnaire form. This includes all necessary process, operating, and cost data and even vapor-liquid equilibria information for unusual systems. Once this is supplied, design calculations can be made on standard forms. Whenever possible, final design is checked with operating data from actual installations.

In short, safeguarding your column investment is largely a question of (1) selecting the correct column design, and (2) submitting carefully prepared and studied specifications.



Construction of Gilsonite Facilities

261 Kaiser Engineers has just completed design and construction of an integrated calciner, cooler and waste heat boiler together with general off-site facilities for the American Gilsonite Company, an affiliate of the Barber Oil Corporation and the Standard Oil Company of California. These facilities are part of a new refinery for processing Gilsonite to produce gasoline, fuel oil, and calcined coke.

Work by Kaiser Engineers included design and construction of a coke calciner, boiler plant, cooling water system, utilities, electrical distribution system, industrial buildings, site preparation, and construction of the ore dressing facilities.

The calciner incorporates several novel engineering design features which will permit a substantial increase in yield of calcined coke beyond yields obtainable in similar types of existing units.

The raw material for this refinery is Gilsonite, a naturally occurring solid hydrocarbon, which will be piped in a water slurry 72 miles from the Bonanza, Utah, mines to the plant site near Grand Junction, Colorado, where it will be dewatered, dried, metled, and sent to a delayed coker. The coker gasoline is catalytically reformed to improve its octane number. The green coke from the delayed coker is calcined and stored for shipment.

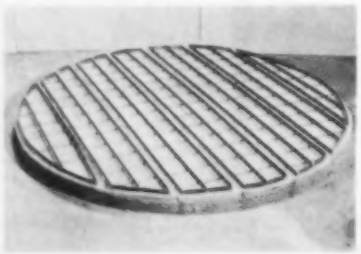
Kaiser Engineers Division, Henry J. Kaiser Company

Wire Mesh Mist Separators

262 Yorkmesh Demisters (mist-eliminators, entrainment separators) improve the performance of process vessels by effecting clean separation between vapor and liquid. Principle behind the operation of the wire mesh separator is very simple. As vapor disengages from the liquid it carries with it fine liquid droplets. Passing through the fine wire mesh, the liquid droplets impinge on the wire surfaces, coalesce into large drops, and fall off. Vapor is then dry and free from entrained liquid.

Selection of the particular style for any specific application is based on the operating conditions and the performance requirements. Size and shape of the process vessel determines whether the unit should be one piece construction or sectional type.

Yorkmesh Demisters are manufactured in a number of wire mesh patterns. These include different density materials from 3 to 33 lb per cu ft in the standard straight crimp style and the herring bone style.



They are available in monel, nickel, inconel, stainless steel, aluminum, copper, brass, carbon steel, carpenter twenty stainless, saran, hasteloy B and C, silver and tantalum.

Applications for Yorkmesh Demisters include vacuum towers, lube towers, compressors, suction drums, knock-out drums, absorbers, gas separator vessels, evaporators, scrubbers and distillation columns.

Otto H. York Company, Inc.

Protects Cooling Tower Lumber

263 The MarTreat double-diffusion method of arresting and preventing the costly destruction of cooling tower lumber by fungus organisms is now in its sixth year of commercial application. This process, originated and developed by The Marley Company, is building an enviable record of protection in hundreds of cooling tower cells that had been treated after short or prolonged periods in service in many parts of the country.

Method consists of successive saturations of the cooling tower with different combinations of water soluble toxic chemicals in high concentration. Chemicals are diffused into the wet wood by absorption or osmosis and penetrate to an effective depth as shown by repeated laboratory tests. The chemicals combine or react in the wood to form almost insoluble precipitates that are lethal to fungus organisms.

The immunity from decay thus established is enduring. Careful periodic inspections of treated towers and laboratory biological examination of wood samples removed from them show the effectiveness of protective treatment.

Towers to be treated are out of service only a very short time. If complete shut-down is not desirable a single cell of a multi-cell unit may be treated while the balance of the tower remains in service. When application is made by the cell-at-a-time method surplus chemicals are prevented from combining with normal circulating water.

"Protecting Cooling Tower Lumber by the MarTreat Process," an informative brochure, is available on application.

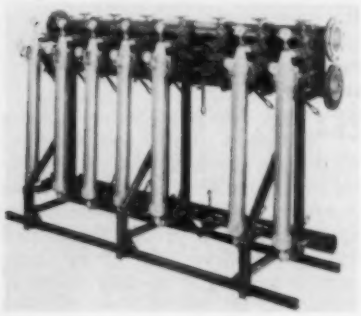
The Marley Company

Filtering Saves Money

264 An Indiana petroleum refining company using the Lindy Sweetening Process uses Fullers Earth for clarification of kerosine, gasoline, and oils. Fullers Earth carry-over goes to large settling and reclaiming tanks. After settling about two hours, the top petroleum product is drawn off. This is somewhat slow and expensive.

A Ronningen Multiplex Filter Unit, 200 mesh, was placed in the line to remove the Fullers Earth carry-over. This effectively removes practically all of the fine particles from the kerosine and the filtered clarified fluid goes directly to the salt drum for water removal.

At a flow rate of 30 gal per min per filter and 90 gal per min for a Triplex Ronningen Unit, the filter cake is blown



down every 4 hours. If 250 mesh is used, practically 100 percent removal of Fullers Earth can be expected, with a flow rate of 20 to 25 gal per min per filter and blow-down of cake about every 2 hours. That is, with a total capacity of 150 gal per min, a Model 206 or 208 Unit would be required.

Use of the Ronningen Multiplex Unit saves time and expense in the reclaiming process. The same Midwest refinery has a Model 208 Filter Unit (as shown) removing iron (ferric oxide), grit and pipe scale from their well water prior to a de-ionizer.

Ronningen Multiplex Filter Units are quick-coupling — that is, one unit can be taken off the line, inspected, and back on in less than a minute. In addition, they are positively non-short circuiting and are sealed at both ends so that no dirt particles can sneak around either end.

Ronningen-Petter Company

Manual Issued for Furnace Operators

265 The 1957 edition of the Petrochem-Isoflow Furnace Manual has just been published by Petro-Chem Development Company, Inc. Scope of the 116-page manual has been broadened by the inclusion of data from over 1650 additional installations. While written primarily for operators of furnaces, the manual will be of benefit to plant designers, operators and instrument men dealing with any type of heater.

Nine different types of Iso-Flow furnaces are described and illustrated, each one designed to meet specific conditions of service, pressure and efficiency. All types have the familiar upright cylinder structure with integral self supporting stack, and feature proper fire box proportions, a reradiating cone for even heat distribution and burners specifically designed to the requirements of the furnace.

Performance records of the Isoflow furnaces are diagrammatically illustrated, showing firebox temperatures and flue gas flow patterns and velocities.

Also contained in the manual is detailed information on construction features of furnaces, instrumentation and accessories, instructions for initial start-up, furnace operation procedures, types of burners, procedures for decoking and instructions for tube rolling and header assembly.

Petro-Chem Development Company, Inc.

Cooling Tower is Prefabricated

266 The Pritchard LoLine Cooling Tower has been specifically developed to provide economical water cooling for industrial processes and air conditioning. Low initial, operating and maintenance costs of tower quickly demonstrates the superiority of water cooling towers over other types of heat removal equipment available to industry.

Dependable operation: Tower is designed for dependable operation with a minimum of maintenance. Only California Heart Redwood is used in the structure and fill because of its excellent resistance to deterioration. Redwood requires no painting or maintenance common to other construction materials. All connectors, bolting and mechanical equipment have been selected for their resistance to corrosion. The asbestos cement board tower casing is fireproof and requires no maintenance.

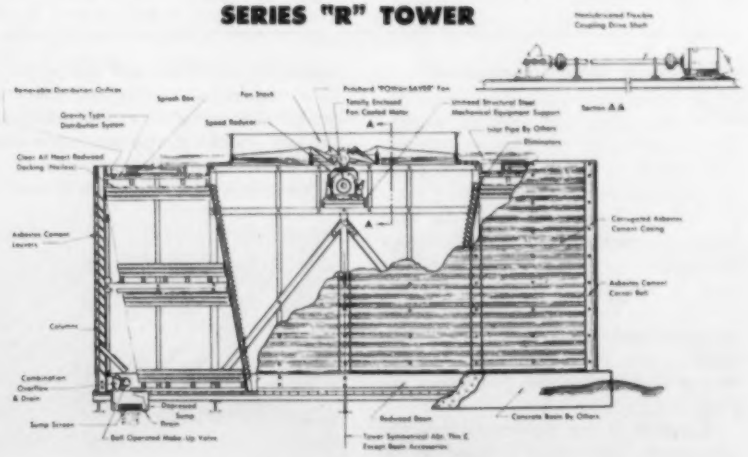
Flexibility in size and use: Series "B" LoLine tower offers a wide selection of cell sizes in a 7 ft 3-in. frame height. The Series "R" LoLine makes available cell sizes of larger capacity in a 12 ft frame height. Both may be furnished in multi-cell arrangements. Because of standardized design, additional cells may be added, without difficulty, to existing installations by removal of one end wall. Towers may be furnished with wood or steel cold water basins for installation on structural steel supports or may be installed on concrete basins. The LoLine tower has been carefully designed to require the simplest and most economical structural supports or foundations, whether steel or concrete.

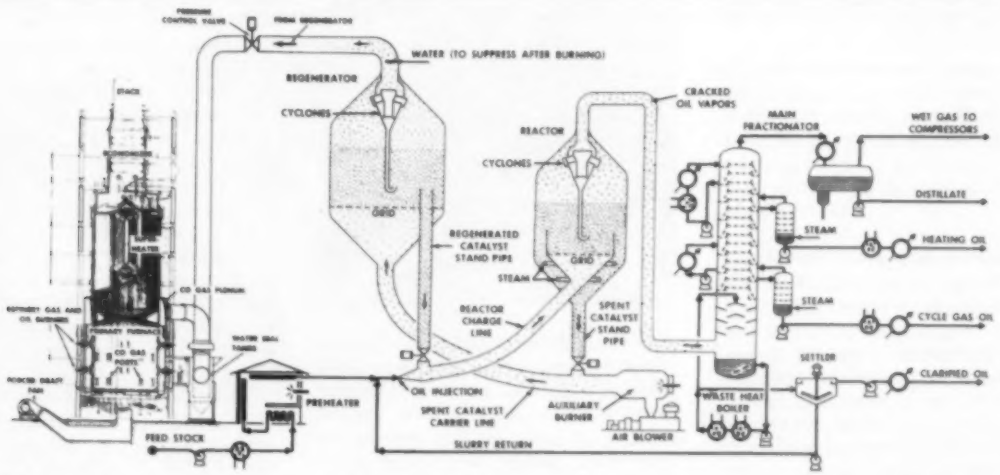
All fittings and accessories in the LoLine tower are readily accessible from the outside for cleaning and maintenance. A full line of accessories is available to suit particular application problems.

Fast, low-cost erection: The LoLine tower is completely prefabricated for easy field installation by semi-skilled labor. Individual parts are kept small in size and weight to facilitate handling. All Redwood parts are prefabricated on precision machinery for easy assembly. All parts are standardized and manufactured to close tolerances so that replacement parts are interchangeable. Mechanical equipment components employ standard parts readily obtainable through regular supply channels.

J. F. Pritchard & Company

SERIES "R" TOWER





Boiler Burns Carbon Monoxide

267 The Babcock & Wilcox Company's carbon monoxide boiler is a recent advancement for improving the heat balance of a catalytic cracking unit. To regenerate the catalyst in the cracking unit, the carbon coating is burned off at a low temperature and, generally, with a deficiency of air. This produces a large amount of high temperature gas containing a considerable amount of carbon monoxide and a trace of hydrocarbons. Fig. 1 illustrates schematically a fluid cracking unit with a CO boiler. The CO boiler was designed to obtain complete burning of the combustibles in the regenerator flue gas steam when using a minimum amount of supplementary fuel. For this unit, both the primary and secondary furnaces and the boiler tube bank were designed as a single integrated boiler unit supported at the top. Allowance has been provided for downward expansion.

Supplementary fuel burners and the CO gas nozzles are arranged for tangential firing, which mixes the gases thoroughly and promotes rapid and complete burning. The primary furnace wall tubes are covered with refractory to minimize radiant heat absorption. Wall tubes also cool the refractory, thus protecting the material when only supplementary fuel is fired.

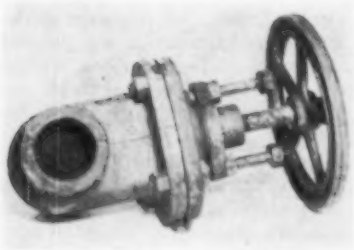
When firing only supplementary fuel to provide steam for starting the cracking unit, the CO boiler is normally designed for full steam flow.

Since the first B&W CO boiler began operation in November 1953, 17 additional units either have been placed in operation or have been contracted for throughout the United States and Canada. Units range in steam flow capacity from 60,000 lb per hr to 450,000 lb per hr. Heat recovery from the CO gas, both sensible and combustible, range from 45 million Btu per hr for the smallest unit to 340 million btu per hr for the largest.

An important consideration in many sections of the nation for installing CO boilers is that air pollution is lessened considerably by the reduction in stack discharge through the burning of the hydrocarbons in the furnace.

Babcock & Wilcox Company

Treating



Rust — Scale Removing By Detergent

268 Tube bundles from heat exchangers and condensers are cleaned with a versatile alkaline detergent that removes rust, scale, and heavy oil deposits in one soaking operation.

At a Washington refinery, for example, iron oxide, iron sulfide, and ferric cyanide deposits had badly fouled the overhead condenser bundles from a crude unit. Exchangers were 30 ft long, 3 ft in diameter and consisted of 1160 half-inch ID tubes. The tube bundles were pulled and soaked for 8 hours in a solution of Oakite Rustripper at a concentration of 1½ lb per gal of water. Temperature was kept around 200 F, and solution was agitated by introducing air into the tank. After cleaning bundles were rinsed for 2 hours with fresh water under 250 psi, until no soil could be flushed off internal tubes. Spaces between tubes were then probed with fine saw blades. If any soil remained, bundles were soaked for another 8 hours and again rinsed. Results: Bundle Number 1 showed 250 percent increase in heat transfer, lower bundle 50 percent increase.

The same material has been used to remove silicon deposits from steam turbines. It was formerly necessary to blast clean with corn cob meal, followed by hand scraping, taking 120 to 200 man hours. The new method consists of removing the cover, inverting, and filling with a 2 lb to the gallon of water solution of Oakite Rustripper at 212 F. After soaking for 12 to 16 hours, solution is pumped out, cover rinsed, dried with high pressure steam, and blown down with air to dispel moisture. The rotor is then removed and placed in a vat designed so the rotor can be turned each half hour in the Oakite Rustripper solution. Rotor may take from 16 to 24 hours to clean. It is then removed, rinsed with steam and water, and finally dried down with steam and blown down with air to remove the moisture. Bottom half of the

turbine, in the meantime, has been cleaned in the same fashion as the cover.

Other units cleaned by this alkaline rust and scale remover includes valves, tanks, gas burners, trays and bubble caps, even depropanizer and absorber towers.

Oakite Products, Inc.

Truck Tanks Are Acid Proof

269 Using Ampco Grade 8 in solid metal plate of average half inch thickness, Ampco has entered a new line of fabrication in making special truck tanks to customers' specifications. Tanks are employed in hauling sulfuric acid sludges from the refinery treating section to disposal areas or to refinery power plants for use as supplimentary fuel.

Aluminum bronze alloy which Ampco furnishes for this job has proved superior to stainless steels and copper base alloys, according to the

company. Tanks and all fittings are furnished according to customer specifications. Same material can be employed in fabricating pipelines as another means to transport the sludge. The petroleum industry is the primary market for the special tanks.

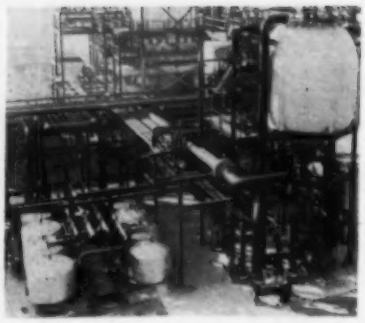
Ampco Metal, Inc.

Boiler Feed Conditioning

270 Cochrane has developed hot process softeners for boiler feed water conditioning systems which provide flexibility and versatility available in no other type of water conditioning process.

Illustration is that of a 2-stage hot lime zeolite system installed in a large western refinery. The first stage is composed of a Cochrane Hot Process Softener, followed by Cochrane Pressure Filters and a second stage of Cochrane Hot Zeolite Softeners.

This combination provides the refinery with 400,000 lb per hr make-up, and all operations of the system are



automatically controlled from a central panel. Effluent from this system is of zero hardness with an alkalinity in the order of 20 parts per million. Partial addition of dolomitic lime reduces the high silica content, and sludge is recirculated to provide faster, more complete precipitation.

Cochrane Corporation

New 'Sweetening' Inhibitor

271 UOP No. 5-S, a new inhibitor, recently added to the long list of highly specialized gasoline additives offered to refiners by Universal Oil Products Company, is a new formulation which is even better than UOP No. 5 for those applications where "inhibitor-sweetening" (oxidation of sulfur compounds) is the controlling factor in the choice of inhibitor used.

Long-noted for its ability to cause rapid oxidation of malodorous mercaptans to odorless disulfides, UOP No. 5 also is the most potent of all gasoline antioxidants and is not susceptible to loss in entrained caustic or water. UOP No. 5-S not only retains the water-insolubility of No. 5 but, in addition, contains a powerful catalyst which promotes even more rapid inhibitor-sweetening. Sweetening can usually be accomplished in ¼ to ¾ the time ordinarily required with UOP No. 5 depending on the mercaptan content and other conditions. Many gasolines that previously were considered impractical for "inhibitor-sweetening" can now be readily sweetened.

No. 5-S may be effectively substituted for No. 5 in any application but should unquestionably be used if the sweetening reaction is a requirement.

Universal Oil Products Company

Davison Enters Field Additives

272 Marking the company's entry into the growing field of petroleum additives, Davison Chemical Company, division of W. R. Grace & Co., announced that it is making available an alkylated phenol which serves as an antioxidant for gasolines and other petroleum derivitives.

Known technically as 2,6-di-tertiary-butyl-4 methyl-phenol, it is marketed as "Dav-Ad 101." Petroleum products are subject to oxidation deterioration, in which undesirable compounds are formed. In gasoline, the oxidation results in the formation of gum which collects in intake manifolds and carburetor jets.

A white flake, non-toxic material, the product is also used as an antioxidant in both natural and synthetic rubber, especially in white side wall tires where non-staining qualities are desired.

Two forms are offered — Dav-Ad 101 which is 100 percent 2,6-di-tertiary-butyl-4 methyl-phenol, and Dav-Ad 102, 33⅓ percent 2, 6-di-tertiary-butyl-4 methyl-phenol in toluene for those who prefer a liquid form.

Davison Chemical Company, division of W. R. Grace & Co.

Valve Designed for Corrosive Service

273 A new 416 stainless steel needle valve designed for corrosive service and suitable for pressures up to 10,000 psi has been developed by the

Jas. P. Marsh Corporation. Constructed throughout of 416 stainless steel these valves are claimed by the manufacturer to be the answer to dependable, safe, and accurate control of many corrosive fluids over a wide range of service requirements.

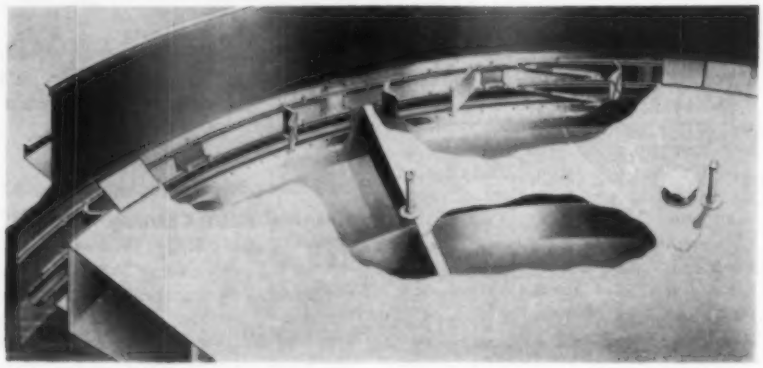
Valve bodies and valvestem guides are machined from solid 416 stainless steel bar stock. The valvestem is hardened 416 stainless steel precision machined with fine pitch threads for exceptionally fine regulation.

Deep chambered threads are machined to extra long length permitting even undersized pipe threads to make up tightly. Another advantage of deep chamber threads is that the possibility of restricted flow due to pipe ends coming too close to inlet and outlet ports is entirely eliminated.

The packing used is of special durable quality called "Marpak," tailormade to fit the extra deep packing space provided on all Marsh Needle Valves. This packing is exceptionally clean, easy to remove and install.

Completing the picture of a modern well-balanced valve is a rugged cross type handle of malleable iron finished in heavy baked enamel.

James P. Marsh Corporation



New Line of Floating Roofs

274 Evaporation loses are serious. Annually they total about $300,000,000.

Four storage conditions affect the extent of these losses: (1) Temperature of liquid, (2) volume of the vapor space, (3) area of liquid surface, and (4) the extent of breathing.

Equipment fabricators have built many types of tanks devised to reduce these losses. Some of them are: (1) Cone roof tanks, (2) floating roof tanks, (3) lifting roof tanks, (4) diaphragm tanks, (5) low pressure tanks, and (6) high pressure tanks. Each of these designs has its place.

About 3 years ago Wyatt undertook a program to develop more efficient floating roofs. The plan included new seal designs and better roof structures for the 3 conventional types, i.e., twin deck, pontoon, pan type floating roofs. This program was completed, and these designs have already been subjected to field tests.

The advantageous features of these roofs are: All roofs are designed so the liquid in the tank is in full contact with the deck plates of the roof; seal is located just above (not on) the liquid surface, permitting only a minimum air-vapor space. At this point the temperature is lower than at any other location in the space provided for the seal. Vapor losses due to thermal breathing are altogether eliminated.

Seal is a heavy woven asbestos cloth coated on both sides with one of two types of synthetic rubber. One is for storage of conventional oils and gasolines, the other for aromatic oils (benzene, ziolene or toluene).

The bottom edge of the shoe is sealed to the rim plate of the roof, and the lapped junction of adjacent shoes is sealed, preventing corrosive vapors from contacting the moving parts of the expanding mechanism.

The expanding mechanism is housed above the seal in the space between the roof rim plate and the shoes and is protected from the weather by rain shields. The pusher springs which load the sliding expansion channels are sheathed in sealed, grease-packed cases providing permanent corrosion protection.

Wyatt's Floating Roofs have been purposefully planned and designed to reduce evaporation losses, eliminate fire hazards, decrease corrosion losses to an irreducible minimum, diminish maintenance and guarantee a maximum of ease in operation. These features insure a profitable investment to operators of floating roof tanks.

Wyatt Metal & Boiler Works, Inc.

Unit Will Log Large Tanks

275 Datalogger, latest addition to Telepulse equipment, will be installed in a large oil refinery. Liquid levels in 72 large storage tanks are automatically logged each half hour with ⅛-in. accuracy.

Each tank is equipped with an S&J Automatic Level Gage and Telepulse Transmitter. Upon interrogation, this unit responds with a unique identification code corresponding to its address and then sends level in feet, inches and eighths. Bursts of fixed-width pulses are generated by cam switches and received by stepping relays. No vacuum tubes or transistors are used and all circuits are designed to "fail safe." Digital transmission up to 1000 miles over one wire (earth return) does not degrade accuracy. Low cost, telegraph-quality lines of 75 cps bandwidth are satisfactory.

The associated logger types time of readout and level (feet, inches and eighths) under the proper tank number printed on the log sheet. Logging of all 72 tanks starts automatically every half-hour, and the log sheet is renewed daily. To check any tank manually, the operator sets a selector switch, presses the "demand gage" button, and reads the desired level on large foot and inch dials. Automatic logging is hereby interrupted for 30 seconds, but resumes where it was stopped.

Thus, the gager is relieved of much routine labor, errors are eliminated, and a permanent record is provided for supervision and accounting purposes. High accuracy inherent in this digital system permits its use in custody transfer, per API Standard 2500. Both precise inventory control and maximum tank farm utilization are realized, and safe operation is insured.

Pressure and other physical variables are also handled. Pump motors and valves may also be remotely supervised and controlled. Addition of the new Datalogger makes this Shand and Jurs equipment a complete process control and monitoring facility.

Shand & Jurs Company

Air Mover Purges Tanks

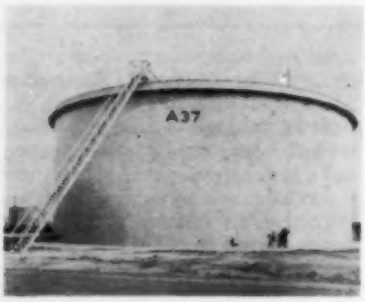
276 Cleaning and repairing tanks can be a difficult job if proper ventilating precautions are not taken. On many such jobs, motor-driven blowers are impractical because of weight, bulk and inconvenience. The problem has been solved with a lightweight device which circulates maximum quantities of air yet has no moving parts.

A venturi-type, portable air mover does the job. Called the M-S-A-Lamb Air-Mover, this comparatively inexpensive device weighs only 31 lb but,

when operated on 60 lb of air pressure, will move as much as 2700 cu ft of air per minute.

Operation is based on the venturi effect produced when compressed air is expanded at high velocity through an annular orifice and outlet horn. The device has no motors, turbines, fans, or moving parts of any kind. Unit is used as a blower or exhauster depending on fume removal requirements. As for transporting the mover, one man carries it from job to job.

Mine Safety Appliances Company



Floating Roof Seal Patented

277 Nooter Corporation has been granted patents on a new, special 2-point suspension seal hanger that is expected to provide greater effectiveness and easier installation and maintenance. Nooter is now ready to become fully active in floating roof services. The company, a custom fabricator of steel and alloy plate tanks and pressure vessels for more than 60 years, has made a number of recent installations of floating roof tanks for oil, chemical and gasoline storage.

Special seal, a conventional shoe-type, is distinguished from other seals by simplicity and effectiveness of 2-point suspension seal hanger. Hanger exerts a uniform outward pressure over the entire height of the shoe, affording better sealing action, and reducing the possibility of abrasion at any 1 point. Operating mechanism is placed beneath the roof, thus leaving the roof deck clear.

The Nooter seal is adaptable to the double-deck, pontoon and pan-type roofs, as well as to any existing type of floating roof. It also can be installed, in a modified design, in existing riveted tanks.

Standard shoe material is galvanized steel, but stainless steel is used in special applications.

Nooter has been in the floating roof field since 1954. Company fabricates and erects through its field construction department all standard types of API-12C storage tanks, fractionating columns, and a wide variety of other petroleum and chemical processing equipment. Floating roof services include fabrication and erection, replacement roofs, and application of new seal to existing floating roofs.

Nooter Corporation

Corrosion Resistant Lining Developed

278 A new corrosion resistant lining material to protect the metal components of chemical process systems has been developed by The Dow Chemical Company.

The product, called Saraloy 898, is an elastomeric copolymer based on vinylidene chloride. First in a new Dow family of such materials, it is a flexible thermoplastic, with extraordinary resistance to a broad range of acids, alkalis, salt solutions and solvents commonly encountered in storage tanks, processing tanks, medium to large diameter pipes and fittings, fume ducts and hoods.

Material is supplied in standard 37 by 133-in. sheets and in from 1/16 through 3/16-in. thicknesses. It can be readily installed in the field or in an applicator's plant by employing a chemically resistant adhesive system. There is no need for vulcanization after the material has been applied. It has good strength and abrasion resistance, will not support combustion and has high elongation and flexibility.

In a range of extensive field tests over the past 2½ years, Saraloy 898 and its adhesive system has given outstanding service life.

The Dow Chemical Company

Floating Roof Catalog Offered

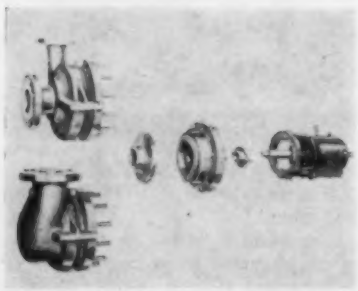
279 A new 24-page illustrated catalog on Floating Roof Tanks is available from Hammond Iron Works. Catalog describes in detail various types of floating roof tanks used for storing all types of volatile or corrosive products. Construction features and functional advantages of each type are clearly discussed and illustrated.

Two types of Hammond floating roof seals are also described in the catalog —the Springtite seal and the Hammond Tubeseal, newest development in floating roof seal design and construction. Springtite is a rugged, mechanically simple metal-shoe type seal which permits movement of the roof without undue friction. Hammond Tubeseal, reputedly the most efficient and positive seal known, consists of a long wearing scuff band of an oil resistant synthetic rubber, and a tube of similar material filled with kerosine, light fuel oil or in non-freezing climates, water. It provides a positive, highly efficient seal at all points between the roof, shell and product and effectively eliminates every space where vapor mixtures can form. Construction details for both types of seals are fully described and illustrated.

Hammond Iron Works

PUMPS

COMPRESSORS

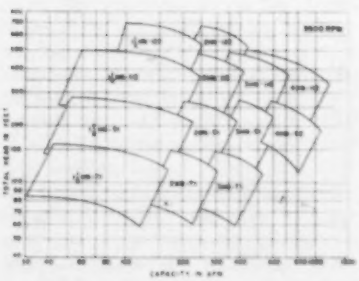


Centrifugal Designed for Heavy Duty

280 Worthington Corporation is now manufacturing a new vertically split centrifugal pump especially designed for heavy-duty service in the chemical, petroleum, and allied industries. Constructed with centerline supported casings and circular casing joints with confined gaskets, the new HN pump is designed for temperatures up to 850 F. Casing thicknesses have been designed to safely withstand working pressures up to 600 psig with an economical ⅛-in. minimum corrosion allowance. HN pump shafts and bearings are sized for minimum deflection to provide trouble-free service under difficult suction conditions.

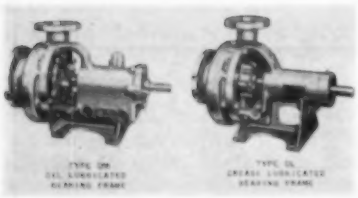
These new pumps are available in three models to meet exacting service requirements: Type HN—end suction, top discharge, Type HNT — top suction, top discharge, and Type HNC — integral seal.

Standardized parts provide maximum interchangeability. Any HN or



HNT pump on the same bearing assembly uses identical bearings, shaft, sleeve, throat bushing, seal gage and gland, and other small parts. For severe corrosion conditions, special alloys can be provided.

Worthington Corporation



Interchangeable Pumps

281 For pumping most all chemical process liquids in moderate capacities and with special emphasis on interchangeability of pump components, Peerless Pump Division, Food Machinery and Chemical Corporation has introduced new chemical process pumps designated as Type DL and Type DM.

General characteristics of these pumps reveal that they are available in discharge sizes from 1 through 4 in. Enclosed or open impeller design is optional construction. Capacities up to 800 gpm are provided. Pumps will operate against heads to 400 ft. Driver can be a standard, horizontal, electric motor mounted on common base with pump.

The new pumps, it is stated, are offered in 2 basic designs: One is grease-lubricated designated as Type DL—the other is oil-lubricated designated as Type DM. Either grease or oil lubrication is available with enclosed or open impellers. Provision is made for water cooling the packing. The pump case is tapped for in-and-out water cooling connections for temperatures to 400 F.

A most important feature of the new pump line is the economy achieved for the user through interchangeability of components. To either frame, the user simply adds the desired back plate, the desired impeller and volute case to build the proper pump for the intended service.

Peerless Pump Division, Food Machinery and Chemical Corporation

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Gas Turbine's Role in Processes

The combustion gas turbine, because of its versatility and adaptability, is becoming more and more an important item in expansions and new plant constructions in the refining and petrochemical industry. Through integration of the gas turbine within the process cycle, industry is provided with two forms of energy from one machine.

Mechanical power from the combustion gas turbine can be used to drive blowers and compressors, or can be connected to a generator to provide electric power for the refinery or petrochemical installation. Heated air leaving the gas turbine can be used in heat recovery boilers to produce process steam, or used as highly preheated combustion air in fuel fired boilers, or in carbon monoxide boilers used in some catalytic cracking processes. The application of combustion gas turbines in butadiene processing plants illustrates the extreme versatility of these machines.

Here the air compressed in the gas turbine's compressor can be heated and used to regenerate the reactors at elevated pressures and then can be expanded through the turbine. Hot exhaust is then used in a waste heat boiler to generate steam.

Ethylene, acetylene, ethylene oxide, and methanol are processes very adaptable to gas turbine applications.

The schematic diagram illustrates one method whereby the large amounts of horsepower delivered by gas turbines can be utilized in process plants. Here a single unit drives a large number of compressors. This design has already proved satisfactory in one installation which has operated continuously for over one year. Several other petroleum refiners have ordered gas turbines for similar operations.

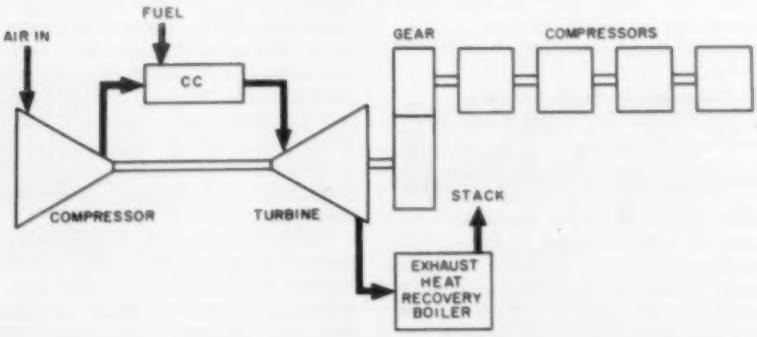
Versatility of combustible fuel burned in combustion gas turbines also makes them a serious consideration for refinery and petrochemical plant operators and designers.

Besides operating on gases which are by-products of the process, the gas turbines can burn natural gas, treated bunker "C" oil, and diesel oil.

General Electric Company gas turbines range in sizes from 7000 to 30,400 hp and the over 120 units presently in service have accumulated more than 1,750,000 hours of operation.

Units rated up to 14,200 hp are base-mounted, piped and wired at the factory, thus greatly simplifying the installation.

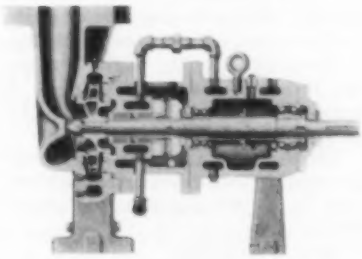
General Electric Company



High Temperature Process Pumping

282 A new line of centrifugal pumps for refinery and process service is being made available this year after an extended period of on-the-job testing under numerous conditions.

Designated Type T because of their top suction and top discharge design, the new pumps are of heavy duty design incorporating API and major oil company specifications.



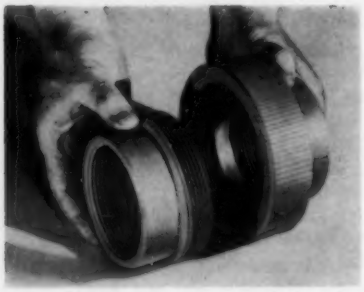
Capacity of the pumps ranges from 25 to 1000 gal per min with total heads up to 650 ft. Working pressures are from 29-in. vacuum to 675 lb per sq in. gage. The pumps will handle liquids of temperatures from minus 200 F to plus 850 F.

The water jacketed stuffiing box is designed to accommodate either conventional packing or a mechanical seal. Water jacket completely encircles the stuffing box and is localized to effectively cool the liquid within the stuffing box without cooling the liquids in the casing.

Dean Brothers Pumps Inc.

Supplier Has More Data — Send Enclosed Card for Fast Service

VALVE FITTINGS and TOOLS



PVC Pipe Union

283 First 3-in. screwed pipe union made of highly corrosion resistant rigid polyvinyl chloride increases PVC piping application possibilities which have been limited by the availability of only smaller sized unions. PVC piping systems are used to handle corrosive fluids in food and chemical processing industries, the refining industry and in the paper and marine fields.

Specially designed surfaces in the joints of the 3-part union provide a tight seal against flow leakage. PVC material is exceptionally resistant to most salts, alkalis and acids at temperatures as high as 150 F, and it is equally resistant to corrosive elements in factory atmospheres and operations.

Weighing about 1½ lb, the 3-in. union is easily handled and installed. A knurled ring provides a better grip to further simplify installation.

The new 3-in. union is available with threaded or solvent-weld socket-type ends in either high- or normal-impact PVC.

Walworth Company

PVC Check Valve Is Designed

284 First all-PVC lift check valve is designed and introduced by Tube Turns Plastics, Inc. at the request of piping engineers in the chemical and petroleum fields.

New lift check valve is simple, durable and efficient and will operate in either a vertical or horizontal position. A full 100 percent flow area is provided. Valve's only moving part is a self-energizing disk. It is available in ½, ¾, 1, 1¼, 1½, 2 and 3-in. sizes, and in threaded or socket welding types. Material is normal impact PVC.

The valve incorporates the principle of a PVC pipe union. This arrangement permits the valve to be easily and quickly removed from the line for cleaning and servicing, when required.

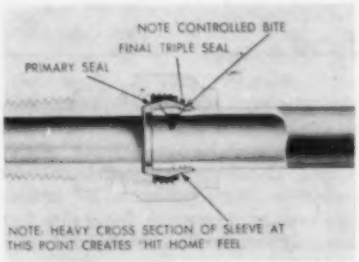
Tube Turns Plastics, Inc.

Flareless Fitting for Steel Tubing

285 Hi-Seal, a new type of flareless tube fitting, makes a foolproof, butt-tight joint and is designed for a full range of pressure conditions. Since a butt-joint is formed, tubing need not be sprung when making assemblies. This is particularly advantageous when working with large-sized, heavy wall or hard-temper steel tubing, all of which are difficult or impossible to spring.

Available in steel or stainless steel in a variety of sizes, fitting consists of a body, nut and alloy steel sleeve. It is engineered to withstand high pressures, hydraulic surge, vibration and other severe operating conditions.

A shoulder on the sleeve prevents in-


NOTE CONTROLLED BITE
FINAL TRIPLE SEAL
PRIMARY SEAL
NOTE: HEAVY CROSS SECTION OF SLEEVE AT THIS POINT CREATES "HIT HOME" FEEL

correct assembly even by inexperienced personnel. Camming action of nut causes sleeve to form a collect-type triple-seal grip on tubing. Final circumferential seal is made by tapered edge of sleeve. There is no tube torquing when making a joint.

Designed and built to remain pressure-tight beyond the burst strength of the tube itself, the Hi-Seal Fitting conforms to JIC Hydraulic Standards and the ASME Code for Pressure Piping.

Fitting is available in sizes for ⅛ to 1½-in. tubing. Each can be furnished with long Dryseal Pipe Threads, or with straight threads with O-Ring seal for use with mineral oil base hydraulic fluid, lubricating and vegetable oils, water and pneumatic service.

Imperial Brass Manufacturing Co.

O-Ring Seals Plug Valve

286 A new plug valve that provides leakproof shut-off is manufactured by Circle Seal Products Co., Inc. New design of the plug features use of three "O" rings. In the closed position, one "O" ring contained on the surface of the plug (90 deg from the flow passage through the plug) serves as a flow seal. This flow seal "O" ring surrounds the inlet port. In the open position, the valve is full ported and allows a straight-through flow passage. Static "O" rings at the top and bottom of the plug and around its circumference prevent stem leakage. Use of the "O" rings eliminates adjusting nuts and springs.

Valve is made of brass and is available with ¼-in. female pipe connections.

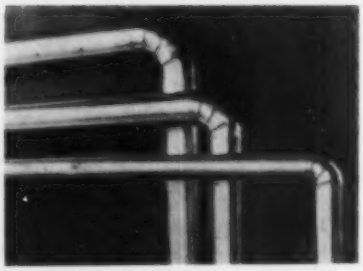
Circle Seal Products Co., Inc.

Jacket Protects Piping Elbows

287 Deep-drawn aluminum jackets to protect insulated elbows is a new addition to the line of Childers Aluminum Weather-Proof Jacketing for insulated lines, towers, vessels and tanks. Ell-Jackets are deep-drawn from .020-in. aluminum, No. 3003 alloy, to cover and protect insulated elbows. They are manufactured for both 90° and 45° ells and have factory-applied moisture barrier.

Childers engineers developed aluminum jacketing for insulated lines in 1949, but until now there has been no satisfactory, economic answer to the problem of protecting the insulation on elbows. New Childers Aluminum Ell-Jackets are 2-piece, precision-formed to fit snugly over the insulated elbow. This gives positive weather-tight protection. Aluminum sheet metal screws are used to apply.

Refineries, chemical plants, power plants and other industries have long had the problem of abuse and damage



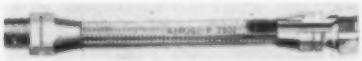
to insulation on elbows. The conventional method of weather-proofing insulation invites physical abuse, which is intensified by the frequent projection of the elbows into areas where there is movement and activity. Vibration of the lines and shrinkage of the insulation are additional factors which have in the past contributed to the problem of weather-proofing. New product is designed to meet this need for permanent-type protection.

Childers Engineering Representatives in major industrial centers in the United States and many foreign countries can furnish complete information on Childers Aluminum Ell-Jackets.

Childers Manufacturing Company

Hose Assembly Holds Acid

288 New industrial hose of Teflon with a leakproof fitting that is completely reusable and detachable has been engineered to give top operating performance in applications where unusual exposure to wide temperature ranges and injurious chemical action is encountered. It has wide potential uses in applications where fluid tempera-



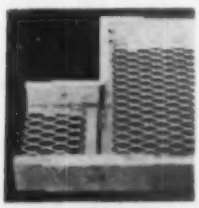
tures range in the —100 to +500 deg zone. Teflon excels in high heat applications and those requiring lubricity, non-adhesion to sticky or viscous materials, chemical inertness, and extra long wear. In the oil industry, it uses cover stationary steam and chemical applications where other materials are unsuitable.

Among the many chemicals and solvents for which Aeroquip 2802 Industrial Hose of Teflon is recommended are: Acetic acid, chromic acid, copper chloride, copper nitrate, copper sulfate, ferric chloride, halogenated hydrocarbons, hydrobromic acid, hydrochloric acid, hydrofluoric acid, mercuric chloride, nitric acid, potassium hydroxide, sodium hydroxide, sodium hypochlorite, and sulfuric acid. Outstanding features of the new fitting, J. I. C. swivel "Super-Gem," are the elimination of cuts and bulges in the hose, a proved lip-seal principle in the fitting design that holds proof and burst pressure even after aging, permanent blow-off protection, and a positive metal-to-metal contact in the sealing that provides permanent fluid seal against all pressures.

Aeroquip Corporation

Reducer Connector

289 Long length sections and fittings – such as elbows, tees, crosses, risers, etc. — are joined together with this combination Reducer and Connector. It replaces the need for a reducer *fitting* and *two* connector sets, and is used either right or left hand. Same item used on various widths, according to degree of reduction: 3, 6, 9, 12, or 18 in. Extremely flexible and saves material and installation time.



P-W Industries, Inc.

Now . . . handle bigger lifts with a **BANTAM!**

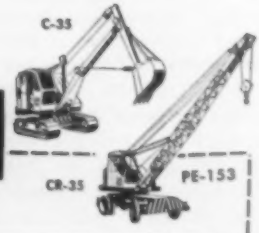
. . . greater stability at any working range!

Here is the new 8-ton BANTAM with its specially engineered Model 300 crane carrier mounting—offering you increased crane capacity, *with or without* outriggers, at normal working radii (15′ . . . 20′ . . . 25′) to handle your crane jobs faster, at lower costs.

BANTAM's job-matched performance between carrier and basic machine gives you more lifting capacity per pound of weight than any other rig in its size class! BANTAM engineering know-how, based on more than 8000 machines in the field, is your assurance of a rig to handle your heaviest work without sacrificing mobility and maneuverability because of excessive "dead" weight.

Here is real heavy-duty performance with easy-traveling mobility for all your loading and placing jobs—including overhead work. BANTAM gives you wider job versatility—working with fast-change attachments for steel erection, stockpiling, excavating, concrete work and pile-driving assignments.

CLIP . . . AND MAIL NOW!



SCHIELD Bantam Co.

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Send information on:
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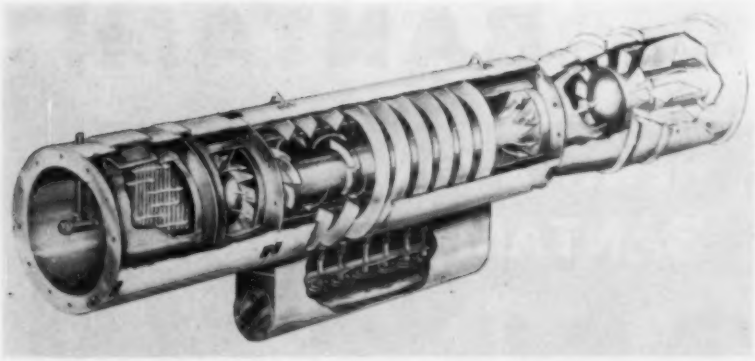
WORLD'S LARGEST PRODUCER OF TRUCK CRANES AND EXCAVATORS



Small Dust Collector Shows Unique Design

290 A new tool for dust collecting has been introduced and demonstrated by Joy Manufacturing Company. One-tenth to one-twentieth the size of comparable equipment, the Joy Microdyne dust collector is a wet, inertial type which is reported to have an efficiency greater than any comparable wet type collector. It has a reported efficiency of 99-plus percent in collecting dust particles of 5 microns or greater.

It was initiated several years ago when Joy Manufacturing Company officials began to ponder ways and means to collect coal dust stirred up by the violent actions of their continuous miner. Existing dust collection equipment was considered too bulky and costly for the applications at hand. In addition, most air cleaning equipment had to be operated under specified conditions which would be almost impossible to maintain in a coal mine.

At the Anaconda Company, engineers had developed an experimental dust collector for use in hard rock mining that had the necessary qualifications of size and adaptability that Joy was looking for. Recognizing the potential of such a dust collector, Joy Manufacturing Company purchased the patent options on the unit and brought the necessary drawings to their research laboratories at Elder's Ridge, near Saltsburg, Pennsylvania.

Resulting new dust collector is unique in being the first commercial dust collector which embodies all of the fundamental principles of the Greenberg-Smith Impinger, long used as the standard dust measuring instrument by the United States Public Health Service.

Real impingement, say Joy engineers, only occurs when dust and its carrying air impinge at high speed, 4500-6000 lineal ft per min, against a film of water. This condition is met in the mixer section.

Unit is a cylindrical device having 2 essential parts; a mixer section and an eliminator section. Dust-laden air or gas enters the Joy unit at its mixer section. Here the impingement takes place and each dust particle is enveloped in water as it passes through a fine spray.

Air and entrained water enveloped dust pass through turning vanes as they enter the eliminator section. These vanes impart a helical motion which causes a centrifugal force. This force dynamically separates the entrained particles from the air and dust-laden water is captured at the periphery of the eliminator section in blind louvres which are connected to a disposal sump at the bottom of the unit.

The cleaned air passes out of the eliminator section through straightening vanes which recover energy of rotation thus reducing over-all draft loss.

If sufficient pressure to drive gases is not available a vaneaxial fan may be attached at the rear of the unit.

Joy Manufacturing Company

Pipe Cutting Tool Improvements

291 The most important new development in the Beaver line of cutting and threading equipment has been the rounding out of a line of abrasive metal cut-off machines up to 12 in.

In addition to the regular models for cutting metal square we now offer the field an angle model, 2 wet cutting models, a hi-boy that cuts up to 12-in. pipe; a trailer model with the abrasive machine driven by a gas engine, and the pipe shop on wheels which offers the abrasive machine, gas engine driven, and a pipe machine to thread pipe or bolts up to 2 in. The pipe machine is driven by a generator operated by the gas engine. Other small tools may also be operated from the take-off on the generator.

Beaver has also developed a line of abrasive cutting wheels based on extensive research and experience. Different types of wheels are offered for various types of cutting, and these wheels are designed to provide not only maximum speed in cutting but also maximum wheel life in keeping with cutting speed.

For example, 2-in. pipe is cut in 5 seconds, 4-in. cast iron pipe in 6 seconds; 2-in. cold rolled steel in 20 seconds; 4-in. steel channel in 10 seconds and 4 by 4 by ⅜-in. angle iron in 12 seconds, and many other equally amazing fast cuts.

Beaver Pipe Tools, Inc.

Dry Chemical Extinguisher For Home and Plant

292 Completely new two-pound, air-pressurized, Model PDC 2A Dry Chemical Fire Extinguisher is now being produced by the American LaFrance Corporation.

Utilizing American LaFrance Dry Chemical as extinguishing agent, this new fire extinguisher is harmless . . . non-toxic . . . non-corrosive . . . and packs the same fire killing power of four 1-qt vaporizing liquid types. It is approved by the Underwriters Laboratories with a 2-B-C rating.

When fire hits, it is already pressurized and ready to go. It is simple to operate . . . just pull up on the carrying handle to break the seal, depress the operating lever and a penetrating cloud of Dry Chemical instantly smothers the blaze. It is simple to service. A glance at the pressure gage indicates its readiness for operation. Complete instructions for recharging and pressurizing are on the label. No special tools are needed to disassemble or reassemble.

Ideal for the protection of small Class "B" (flammable liquids) or Class "C" (electrical machinery) risks, model PDC-2A was designed not solely for industry, but also to provide a home sized fire extinguisher best suited for the protection of the home and priced within the average householder's budget.

American LaFrance Corporation

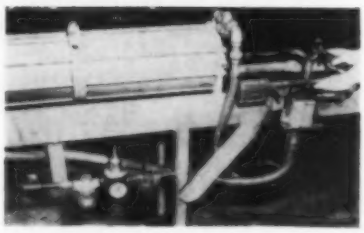
Shop-Built Rope Tester Promotes Safety

To detect and eliminate weakened rope slings before they fail under load, engineers at Calumet & Hecla's Wolverine Tube Division Detroit plant designed and built a simple, rugger, mobile rope tester out of spare parts.

Wolverine, a major producer of copper, brass and other types of tubing, uses approximately 5000 rope slings in 6 and 8-ft lengths to handle unit loads of tubes in process. Rope slings are desirable because they do not mar the surface of tubing. The rope tester was developed as part of the plant's overall safety program.

The framework of the tester consists of an 18-ft-long H-beam supported by 4 braced angle-iron legs welded to the beam's flanges. Each pair of legs is supported on a caster mounted length of U-channel.

An 8-in. ID air hydraulic cylinder with a 15-in. stroke, taken from a scrapped machine, provides the force for testing the slings. The cylinder is bolted to the web of the H-channel, and a hook is mounted on the cylinder plunger. The cylinder hook runs in a groove so that it does not twist as the



rope is put under tensile load. A double hook, which can serve for both rope lengths, is mounted at the opposite end of the H-beam.

Air at 80 psi is supplied to the unit and a pressure regulating valve steps it down and maintains a pressure of 38-40 psi to the cylinder. A moisture trap and lubricator are also installed in the compressed air line.

The test procedure is simple. A rope sling is mounted for testing by slipping the loop ends of the sling over the hooks. The operator then opens the air valve to the cylinder, thereby applying a 2000-lb tensile load on the rope sling. The load is maintained until rope creepage stops. A sling in satisfactory condition will give a certain degree and then hold steady. A faulty sling with continue to creep until breakage occurs.

A testing schedule assures that every rope sling used in the Calumet & Hecla plant is tested once a month. To keep a quantitative record of the test, a Veeder counter was mounted on the machine. The counter is linked to the air valve so that actuating the valve automatically actuates the counter. The operator records the counter reading when he starts testing a load of slings and the reading when the tests are completed.

Wolverine Tube, Division of Calumet & Hecla, Inc.

YEL ⊖ BAK

Industrial THERMOMETERS

Flat Bore—Mercury Filled—Engraved Stem—with 18-8 stainless steel stems. Chromium-plated case to resist corrosion and dirt. These midget industrial thermometers are recommended for equipment requiring Small Armored thermometers . . . and where large industrial thermometers are inappropriate.

An economical instrument . . . because thermometers may be replaced "on the job" . . . that is—refill can be inserted into Armored Case without difficulty . . . eliminates necessity of sending instrument to factory for thermometer replacement. Assured Accuracy.

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Welding Equipment Cuts Non-Ferrous Metals

293 In one of the most interesting developments of the current year, Air Reduction Sales Company, a division of Air Reduction Company, Inc., has utilized the high current density of its Aircomatic[R] welding process to provide a new method for the cutting of various non-ferrous metals.

New method, designed for both straight-line and shape-cutting, is particularly applicable for high-speed cutting and shaping of plates and parts to be joined by gas-shielded arc welding. Cut edges produced usually require no further processing prior to welding.

Various non-ferrous metals in a variety of thicknesses have been cut successfully with the Aircomatic method. While the majority of applications to date have involved aluminum and stainless steels, chrome steel, nickel, Monel, Inconel, copper, brass and aluminum bronze have been successfully cut. Severance cuts also have been made in titanium and magnesium.

For both manual and machine cutting, standard welding equipment is employed. Operation is relatively simple requiring no special operator techniques. The change from welding to cutting with the same equipment requires, at most, a change in the Aircomatic wire and shielding gas and an increase in current and wire feed speed.

With a few exceptions, the new method is closely allied with gas-shielded metal-arc welding procedures. Higher current and wire feed speeds are required for cutting, but the most significant difference is in the arc itself. In welding, the arc is maintained between the tip or end of the wire and the upper surface of the plate; in cutting, the arc is maintained between the leading side or edge of the wire and the leading edge of the cut, extending throughout the entire depth of the kerf. Cuts can be started by piercing or at the edge of a plate as required. Bevel cuts are easily obtained.

With the new Aircomatic process, cuts can be made successfully in all positions except overhead. Although possible, they are not recommended.
Air Reduction Sales Company

Fire Shuts Stop Valve

294 The Milwaukee Valve Company is manufacturer of a recently developed positive safety stop valve, indentified as the P-903. Upon installation fire hazards and accident losses in multiple dispensing remote pumping systems are eliminated. Position of installation is in the base of each dispenser where the product is being pushed from storage. As a 160 F fusible plug will melt, causing positive closure automatically, there is no worry about island fires.

Another automatic feature ends the possibility of product loss, spillage and accompanying hazards should be a vehicle strike a remote pedestal. An outlet shear plane, machined both inside and out, will break under a 250 ft-lb impact causing positive closure automatically. A tapered fusible link pin permits, if desired, positive closure under slight impacts or jars.

Other features of this valve are: Does not have to be removed for inspection or repair, full through flow is assured, as no internal part of the valve projects into the flow stream. A double wedge gate, which may be operated manually, permits positive closure, and allows usage of other dispensers when other dispensers are inoperative or down for repairs.

The Milwaukee Valve Company, a subsidiary of the Controls Company of America

Unit Added to Cooler Line

295 A new induced draft, horizontal air discharge Fluid Cooler has been added by The Trane Company to its established line of dry-type Fluid Coolers. Trane designed and developed the new Fluid Cooler type especially for steam condensing, hydrogen condensing, jacket water cooling, oil cooling, and gas cooling applications in gas transmission stations, refineries, chemical plants, and natural gasoline plants. Unit is available in 9 sizes with a capacity range of from one million to 10 million Btu per hr.

The induced draft cooler consists of 3 basic components — one or more extended surface heat transfer coils with

Trane mechanical fin-to-tube bond, a propeller fan with drive, and rugged steel support structure.

Using ambient air, the Fluid Cooler cools high temperature fluids in a closed system. The units require no water, which makes them ideal for applications in areas where water is at a premium.

Fluids to be cooled are pumped through unit cores and cooled as air is drawn over finned tubes by the fans.

Liquids or vapor can be cooled or condensed from a maximum of 800 F to a final temperature of 20 deg above ambient temperatures, at up to 1000 psi working pressure.

Features of the unit are automatic or manually controlled pitch fan, vibration-free operation, and motor and fan drive installation outside hot air discharge, in safe, accessible waist level location for complete ease of maintenance.

The controllable pitch fan provides for a precise method of controlling a variable flow of air to maintain predetermined temperatures. Design is similar to that employed for aircraft.
The Trane Company

Ultrasonic Emulsifier

350 In a new line of ultrasonic emulsifiers . . . called the Rapisonic, the Autosonic, the Dispersonic and the Minisonic . . . a new principle of operation is used which has resulted in considerably less expensive and easier-to-maintain machines.

These machines use the fluid-dynamic forces of the liquids themselves to produce the sound waves, instead of generating the ultrasonic energy outside the liquids. This is accomplished by impinging the liquids to be emulsified in a jet stream on the edge of a blade. The blade vibrates at its natural frequency (about 22,000 cycles per sec). Cavitation occurs continuously in the stream rushing past the blade. All energy is developed and used right in the liquids.

The Rapisonic, consists of a gear-type pump and ultrasonic head driven by a 2-hp motor. It has an output up to 350 gal per hr and handles emulsions of high and low viscosity.

The Autosonic emulsifier meets the need for a continuous supply of emulsion automatically geared to process volume. The oil, water and emulsificant are pumped separately into the Autosonic via three control valves and flow rate indicators in order to adjust the proportions of each in the final emulsion.

The Dispersonic differs from the Rapisonic above in that it is designed to handle dispersions of powders in liquids or emulsions of an abrasive nature. While it uses the same type of ultrasonic head, it substitutes a continuous cavity pump for the gear pump of the Rapisonic.

Sonic Engineering Corporation

Titanium Valves

297 The oil and gas industry may have the answer to valves that corrode, which continually presents a costly maintenance problem. They are valves made of titanium, virtually corrosion-free.

The fabricated products are 6-in. Di-Fab wedge-gate valves, about 24 in. in height, which also are stronger and lighter than stainless steel valves of comparable size.

Developing the first fabricated titanium valve cost about $6000 to $10,000 for about 60 lb; or 40 lb less than one of comparable size fabricated of steel. Titanium is still costly, ranging from $16 to $18 per lb. However, titanium is an exceptional metal and is uniquely superior in resisting corrosion by such common industrial chemicals as nitric acid solutions of chlorine and chlorinated compounds.

Fabri-Valve Company of America

Insulated Conduit Is Prefabricated

298 A new low-cost, prefabricated insulated pipe conduit has proved effective in protecting underground steam and hot water systems from corrosion. Called Temploc, the pipe and its fibrous glass insulation are protected by a strong jacket of spirally-wrapped glass cloth and Laminac Polyester Resin. Built up of two plies of cloth and resin over a sheath of kraft paper, the protective shell is not affected by moisture or corrosive electrolytic action of the earth.

Initial cost of Temploc insulated pipe conduit is reportedly about 20 percent less than steel; its weight is about 50 percent less than steel, and 25 percent less than tar coatings.

Manufactured by Temploc Inc., insulated pipe and fittings are custom-cut to specific architectural and engineering specifications. The outer covering can be applied to any type of pipe—steel, iron, copper, brass. System is delivered to the site complete with units numbered and ready to install, together with easy-to-read blueprints for each job to facilitate accurate installation. Provisions for expansion and contraction are engineered in the system. Factory supervision and application of field joints are provided.

American Cyanamid Company

JERGUSON LARGE CHAMBER GAGES

Transparent type, with non-frosting extension.

. . . the best and most accurate for unusual conditions

Jerguson Large Chamber Gages are specially designed to make possible the most accurate liquid level readings under unusual conditions such as where the liquid boils or surges. Gage chamber is of such large diameter that turbulence is reduced so you don't have to *guess* at liquid level. Also available with a patented frost preventing unit which prevents frost from building up on the vision slot when gaging low temperature, low boiling point liquids . . . or with dual ½" internal heating tubes (unrestricted ¾" side connection) for heavy viscous liquids.

For unusual gaging conditions, investigate the special features of Jerguson Large Chamber Gages. Send for detailed data unit.

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Gages and Valves for the Observation of Liquids and Levels

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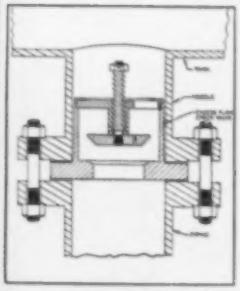
New! EXCESS FLOW CHECK VALVES
For BUTANE – PROPANE – AMMONIA and OTHER PRESSURE LIQUIDS
Up to 10" PIPE SIZE



A NEW, rugged steel and stainless steel excess flow check valve for extra-heavy pipe sizes 2", 2½", 3", 3½", 4", 5", 6", 8" and 10".

Approved by Underwriters' Laboratories, Inc. for Butane-Propane use, No. 166 SERIES MGM EXCESS FLOW CHECK VALVES are designed for maximum flow as both excess flow check and back check valves, with absolute minimum liquid hammer.

Valve flange fits 300 lb. American Standard steel pipe flanges, using standard size gaskets.

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METAL GOODS MANUFACTURING COMPANY
110 S. Park Ave. — Bartlesville, Oklahoma

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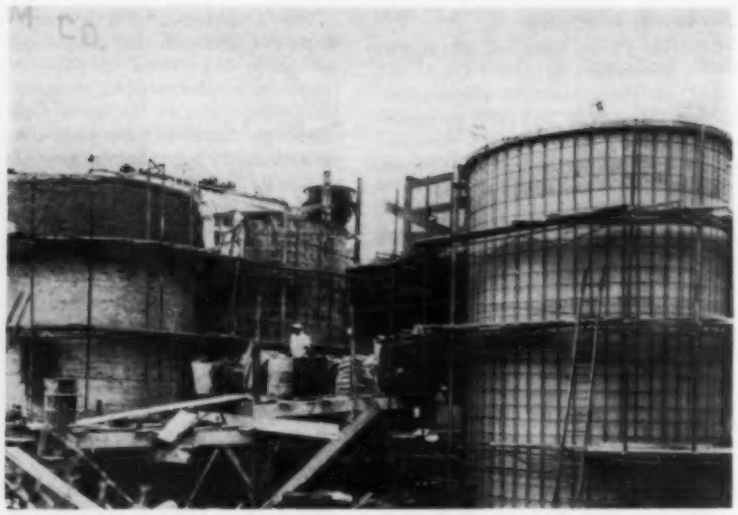
New Technique...



Three different construction stages. As the initial step, tank is surrounded with a paper-backed wire lath attached to a Trussteel stud framework. Next step is the spray-gun application of the first coats of perlite concrete. Final coats of perlite concrete are being applied to the tank at left.

← **Application of the perlite concrete** fireproof barrier around the 50,000 gal fuel tanks was machine-sprayed. Insulating concrete adhered readily onto a paper-backed wire lath which had been attached to a Trussteel stud framework.

Fireproofs-Insulates Tanks

A new technique has been developed for protecting gasoline and oil storage tanks from the dangers of fire and evaporation loss by protecting them with perlite insulating concrete.

United States Gypsum Company recently used the new method on three medium-size fuel tanks at its Philadelphia plant. In this case, the company wanted to enlarge one of its buildings that was very close to the 50,000 gal fuel tanks but was unable to do so because of municipal fire regulations. Approval was granted, however, after the tanks had been fireproofed with concrete made with perlite, an expanded volcanic mineral.

At the same time the perlite concrete serves as an effective insulator to minimize evaporation loss. In many instances, and with fixed-top storage tanks in particular, heat input through the tank shell and other causes of vaporization permit profits to boil out into the atmosphere.

Additionally, the perlite concrete protects the metal tanks from rust and weather and is rot and vermin proof. As a result, annual tank maintenance costs are slashed. Furthermore, the white perlite concrete created a highly-pleasing, textured, monolithic surface that is easy to keep.

Application of a 6-in. thickness of perlite concrete around the tanks was machine-sprayed onto a paper-backed wire lath which had been attached to a Trussteel stud framework erected around the tanks.

This framework was connected only at the top of each tank and to runners circling the base. Thus the perlite concrete protection was built structurally independent from the metal tank exterior so as to provide a 1¾-in. dead air space. The insulating property of the perlite concrete barrier together with the dead air space is calculated as having a U value of .16. This highly satisfactory insulation value is equivalent to that provided by more than 3 ft of structural concrete.

When completed, the perlite concrete was waterproofed. Tank tops were also protected with perlite concrete and then covered with 4-ply membrane gravel roofs.

The composition of the concrete mix was as follows: 4 cu ft of perlite to 1 bag of Portland cement, 5 lb Lumnite cement, 3 oz of NVX air entraining agent (vinsol resin solution) and 62-64 lb of water.

Perlite concrete sprayed walls of this construction are approved for 4-hour retardant ratings. They may be applied by any experienced lathing and plastering contractor equipped with spraying equipment using methods developed by the Perlite Institute.

According to the plastering contractor on this project, Venzie Corporation, Philadelphia, concrete made with lightweight perlite aggregate was specified for fireproofing and insulation because of light weight. Perlite, a volcanic rock that has been "popped" under heat like popcorn, is comprised of white, noncombustible cellular particles whose myriad tiny sealed air cells make it an excellent insulator.

The fire-retardant quality of perlite concrete is due, in part, to the fact that perlite concrete when exposed to fire releases chemically-combined water in the form of vapor. This action limits the temperature to 212 F until all of the water has been driven off. Additionally, concrete made with perlite has only limited expansion at high temperatures. Consequently, there is a minimum of cracking upon exposure to flames preventing fire from penetrating the concrete barrier.

Refining Catalogs and Literature

Stearic Acids

299 "Emersol Stearic Acids" is the title of a new, 24-page booklet. Available upon request, the brochure is designed to aid in the selection of the proper grade of stearic acid for each end use. It interprets the results of analytical tests commonly performed on stearic acids, and contains a discussion of physical properties of commercial stearic acids and their relation to its palmitic stearic acid ratio. Tables are given listing the composition of typical grades of stearic acid, as well as a stearic acid selection chart.

Also included in the booklet is a section covering the handling of stearic acid, and a complete description of all grades of Emersol Stearic Acids, with emphasis on the significance of their outstanding oxidation and color stability.

Emery Industries, Inc.

Self-Closing Pipe Insulation

300 Complete specifications for Mono-Kover, a slit, one-piece, sectional type molded mineral wool pipe insulation that snaps into place, are presented in a new 3-color bulletin. In addition to describing completely the insulating properties of the material, pamphlet explains and illustrates approved application methods. Thermal conductivity is shown graphically for every temperature throughout its operating range (to 350 F).

Bulletin lists and describes the various facings for the material which are available and presents, in tabular form, thicknesses recommended to insulate pipe sizes from ¾-in. to 24-in. according to temperature and type of application. Types of applications include: Industrial, commercial, institutional, hot water, low-pressure steam, cold piping, and dual temperature service.

Baldwin-Hill Company

New Safety "Check List"

301 To locate the hidden probabilities of electrically ignited explosions in plants, a "Hazard Finder" is being made available by Crouse Hinds Company.

This 8-page, illustrated folder contains a check list of 13 questions that can help you determine whether uncontrolled flammable gases, vapors, dusts, liquids and other combustible materials are making your plant unsafe. Part of the folder is sealed until all the questions have been answered. After the seal is broken, an evaluation of the hazard potential in your plant is revealed, based on your answers and the findings of the National Fire Protection Association.

Crouse Hinds Company

Flow Control

302 A new 12-page, 2-color catalog (No. 800) titled "Positive Flow Control," covering Hills-McCanna Proportioning Pumps and Diaphragm Valves has been released by Hills-McCanna Company.

This new catalog describes in detail the 4 basic models of precision proportioning pumps for use whenever there is a requirement for accurate and positive proportioning of flow in the range of 0-730 gal per hr. The materials of construction, capacities and pressures are shown for each model.

The line of Hills-McCanna Diaphragm Valves for positive closure are described and their exclusive features are pointed out. Of particular interest, is the section on plastic valves and diaphragms, where plastic valves for temperatures up to 300 F are shown and the diaphragm material chart that provides a diaphragm selection for such diverse services as air, water, corrosive applications, slurries, liquids and gases.

Hills-McCanna Company

Air Pollution

303 Phoenix Precision Instrument Company announces the availability of a new 8-page bulletin JM-1000-C. This bulletin illustrates and describes a new Portable Air Pollution Photometer that is indispensable for measuring and controlling outdoor and indoor air pollution. A few typical indoor applications include the monitoring and control of dust free work rooms maintained by manufacturers of pharmaceuticals, chemicals, precision instruments, bearings, gyros, electronic tubes, transistors, and all other products which must be produced with a high degree of cleanliness. Bulletin illustrates and describes the optical and electronic system used. It lists applications, sensitivities ranges, and other important engineering data.

Phoenix Precision Instrument Company

High Temperature Insulation

304 Bulletin covers a new line of calcium silicate insulations for temperatures up to 1200 F. This material, with the tradename of "Thermasil," finds major uses in the power and process industries.

The 6-page bulletin gives basic sizes of insulation for pipe covering and block for process vessels or other equipment. Included also are data on basic features which suit the new material to present-day requirements. Physical properties are tabulated and thermal conductivity given in graph form.

Tables give simplified thickness standards for pipe covering that permit nesting of layers, thereby reducing plant inventories in sizes and thicknesses. For temperatures between 600 and 1200 F, tables on block and pipe covering give recommended thicknesses (nominal) for double layer combinations of Thermasil with an outer layer of Thermalite (Ehret's 85 percent magnesia insulation).

Ehret Magnesia Manufacturing Company

for leakproof, pressure-tight connections
use TiteSeal®
SEALING COMPOUNDS
Heat and vibration-proof, non-solvent, will not shrink, crack or crumble. Makes all assemblies leak-proof and pressure-tight. Prevents rust, corrosion, joint seizure.
BRUSH-ON
7 BASIC BLENDS
LIQUID WRENCH®
The super-penetrating rust solvent
LOOSENS
rusted bolts, nuts, screws, 'frozen' parts
Liquid Wrench works fast ... yet is absolutely safe for all metals and alloys.
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At Industrial, Automotive, Hardware, Plumbing Jobbers
RADIATOR SPECIALTY CO.
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Chrome Steel Data

305 Engineers involved in the design, construction and operation of equipment involving the use of tubing and piping at elevated pressures and temperatures, will be interested in the up-to-date information contained in bulletins 145A and 152A issued by The Babcock & Wilcox Company's Tubular Products Division. Bulletin 145 discusses B&W Croloy 2¼ (2¼ percent Cr, 1 percent Mo) and Bulletin 152 deals with B&W Croloy 1¼ (1¼ percent Cr, ½ percent Mo).

Tubing, pipe, welding fittings and flanges of these steels are widely used in refinery, petrochemical, and steam services. Folders present technical data on analysis, mechanical and physical properties, fabrication, heat treatment, and maximum allowable working pressures for various applications at different metal temperatures.

The Babcock & Wilcox Company

Approach to Chromatography

306 A new 16-page booklet from Merck & Company, Inc. comprehensively outlines a different mechanical approach to the problem of distributing substances across to immiscible liquid phases, the analytical technique of column partition chromatography which is currently finding favor among analytical chemists.

Booklet bears the self-explanatory title of Column Partition Chromatography. Laboratory workers will find the various applications of the technique carefully explained, with appropriate illustrations to demonstrate many of its principal uses.

Author of the booklet is Dr. Nelson R. Trenner, research associate in physical chemistry, Merck Sharp & Dohme Research Laboratories. He recently received the Certificate of Distinction from New York University for his contributions to science.

Merck & Company, Inc.

Teflon Described in Bulletin

307 A complete line of gaskets, back-up rings and "O" rings that are impervious to the most destructive acids, alkalis, corrosives and solvents at temperatures from −120 F to +500 F are described in a newly published brochure. Information includes service and mechanical recommendations, data on operating pressures and standard sizes and dimensional details.

The gaskets, back-up rings and "O" rings are fabricated from DuPont Teflon under the registered Crane Packing Company trademark, Chemlon. Gaskets are available in solid or envelope types. The latter features "Free Flow" design which eliminates flow restriction and turbulence in the line and also eliminates danger of rupture at high temperatures due to air entrapped between the insert and Chemlon envelope.

Back-up rings, solid or split, and "O" rings are available in a full range of standard sizes for all commercial and AN requirements. Specials can be fabricated to order.

Crane Packing Company

Stainless Steel Data

308 A new 32-page booklet on stainless steel sheet and strip which gives detailed information on these products is now being distributed by Allegheny Ludlum Steel Corporation.

Booklet has more than 20 tables including detailed data on a stainless steel finder, corrosion resistance of various stainless steels, fabrication properties, and weight tables per lineal foot in various widths and gages.

There are sections on the proper selection of stainless steel grades, and an industry index of applications in the automotive, food processing, chemical, pulp and paper, refining, and other industries.

Allegheny Ludlum Steel Corporation

Sodium Dispersions Data

309 A new, completely revised edition of the brochure, Sodium Dispersions, has just been published by U. S. Industrial Chemicals Company. The new 42-page booklet is 50 percent larger than the earlier edition, and is a complete up-to-date, and well-illustrated exposition of the technology of preparing and using sodium dispersions. Sodium dispersions are microscopic particles of metallic sodium dispersed in organic hydrocarbon media.

Key points covered in the new brochure are:

- Reactions that can utilize sodium dispersions.
- Design and operating instructions for laboratory, pilot, and plant scale equipment.
- Complete procedures for several typical reactions involving sodium dispersions.
- Equipment layout for continuous preparation of dispersions.

This last concept, the preparation and use of sodium dispersions on a continuous, rather than batch basis, is presented for the first time in this brochure.

U. S. Industrial Chemicals Company, Division of National Distillers and Chemical Corporation

Percolation Adsorptive

310 Just published by Minerals & Chemicals Corporation of America is a new 24-page technical publication describing "Percolation Adsorptive Processes." Bulletin discusses both static and moving bed processes, particularly in relation to petroleum applications.

Of particular interest is a thorough discussion of thermal regeneration and many design equations, including maximum permissible flow rate.

A special section is devoted to the new patented "Continuous Percolation Process," which is a Minerals & Chemicals' development.

This bulletin for the first time assembles the complete requirements of these processes and contains much data which has not been previously available in published form.

Minerals & Chemicals Corporation of America

Viscosimeter Catalog

311 Fischer & Porter Company, manufacturer of process instrumentation, has published a catalog on its Viscorator, an auto-sampling device which continuously measures and records both the temperature and the temperature-compensated viscosity of liquids flowing in process piping. The Viscorator system is particularly appropriate to the petroleum refining industry.

Principal advantages of the F&P Viscorator, in addition to continuous measurement, are rapid response and the elimination of cumbersome temperature baths. Capacity of the Viscorator is such that flow rates ranging from 4 to 18 gal per min and viscosity ranges up to 2500 seconds may be sampled.

Fischer & Porter Company

Welding Equipment

312 The complete line of equipment designed for use in applications of Air Reduction's tungsten arc Heliweld process is illustrated in a new 20-page catalog now available.

Catalog 2300, entitled "Heliweld Equipment" discusses the advantages of the Heliweld process and the factors which determine equipment selection. It contains information on various types of manual, semiautomatic, and automatic equipment, and on accessory devices such as the arc starter, high-frequency oscillator, control panel and filler wire feeder.

In addition, several pages are devoted to the selection of the electrode and the filler wire most suitable for use in any specific Heliwelding operation.

Air Reduction Sales Company

Mass Spectrometer Leak Detector

369 Twelve pages explain operating principles and describe diagrammatically 5 methods of leak detection, plus information on specifications, maintenance, and optional equipment (audible alarm, remote indicator, helium concentration indicator, calibrated leak, and sampling probe). Maintenance information includes location and street addresses of the company's Apparatus Service Shops and Apparatus Sales offices. Typical applications covered range from atomic reactor equipment and aircraft gyros to power tubes and semi-conductors.
General Electric Company

Arc and Torch Welding Wall Charts

365 Two new 2-color wall charts, designed for tecnhical schools and plant training programs in the practical aspects of torch and arc welding are now available from the Eutectic Welding Alloys Corporation.

Each chart, measuring 22 by 34 in., is designed to fit into welding training programs by providing students with graphically clear illustrations of correct arc and torch welding procedures.

The Torch Applications chart (TIS 2690) explains the meaning of low temperature welding, examines the good and bad of common joint designs, and the purposes for which thin flowing and bead forming alloys are designed.

Heating and fluxing procedures, with emphasis on torch distance, angle and motion are also included.

The Metallic Arc Application chart (TIS 2689) explains the benefits of low heat input, particularly the avoidance of cracking, hardening and embrittlement in the weld zone.

Simple, easy to understand illustrations demonstrate electrode manipulation techniques, pass sequences for "cold welding" cracks, for building up crack sensitive deposits, and for avoiding slag entrapments in fill-ins.

Other special problems considered are joint designs, stress raisers, dissimilar thicknesses, and labor saving metalworking electrodes for chamfering and piercing all metals.
Eutectic Welding Alloys Corporation

Sonic Gas Analyzer

364 Data on a gas analyzer employing the velocity of sound and offering exceptional range, sensitivity, and rapidity of analysis, has been released by the National Instrument Laboratories, Inc. The monitoring of gas mixtures by continuous or batch control, the detection of minute amounts of harmful gases in pollution or personnel safety problems, vapor and gas chromatography, and the study of isotope concentration in certain gases are a few of the Sonic Gas Analyzer's many applications.

Sonic Gas Analyzer exploits the wide differences in sonic velocity by achieving such measurable sensitivities as 0.005 percent of oxygen in air and 0.00061 percent of hydrogen. The usual linking of high sensitivity with limited ranges of gas concentration, typical of other types of analyzers, does not exist in the sonic velocity method. The high sensitivity remains the same over the range of 0 to 100 percent.

Instrument contains a long tube in which the velocity of the sound is measured. The gas is fed into the sonic tube at its center and flows out at both ends, so that the velocity of flow does not increase or decrease the rate of sound transmission. Sound waves are generated at one end of the tube and are received by a crystal transducer at the other end. An oscillation frequency of approximately 150 kc per second is used to give high sensitivity. The phase of the received signal is compared with that of the generating crystal and the phase shift is a precise measure of the change in velocity of sound propagation.
National Instrument Laboratories, Inc.

COLD-DRAWN STEEL
TUBING

Carbon, Alloy, Stainless or Electric Resistance Welded Tubing, right from the largest mill in the West. Available up to 4-inch diameter.
Straight lengths are now available up to 58 feet long in many analyses. Pacific's strategic location insures prompt, efficient production plus engineering aid if you need it.

COLD-DRAWN STEEL
BARS

Tested by precision laboratory equipment, Pacific Bars are available from 3/16" through 3½" diameter in many analyses. Chemistries include C-1018, C-1137, C-1117, C-1045, MXC-1213 and Ledloy grades A & B.

GROUND, POLISHED, STRESS RELIEVED
SHAFTING

Stress relieved in our own furnaces, automatic equipment, and constant inspection at every critical stage of manufacture makes Pacific stress-relieved shafting "strictly quality" where precision counts. Available through 2-3/16" diameter.

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MANUFACTURERS OF COLD-DRAWN TUBING · BARS · PRECISION SHAFTING

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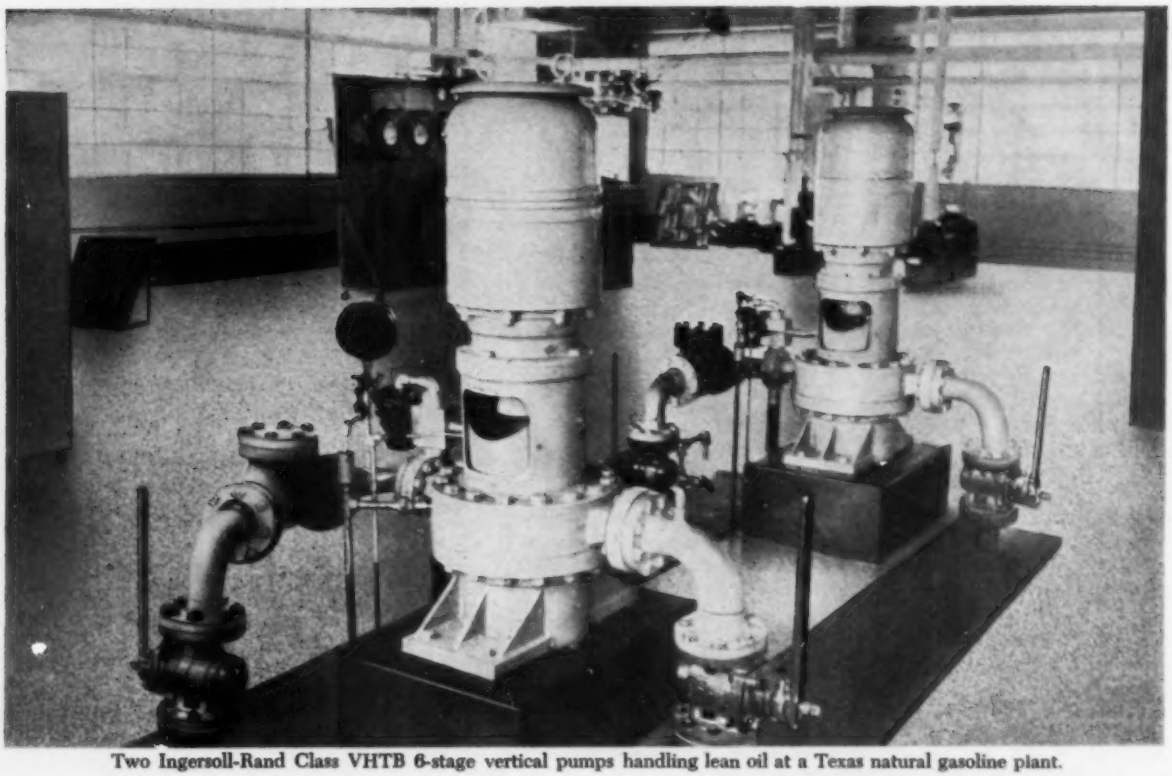
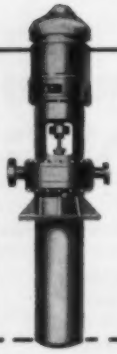
VERTICAL PUMPS



Two Ingersoll-Rand Class VHTB 6-stage vertical pumps handling lean oil at a Texas natural gasoline plant.

to lower your pumping costs



CLASS VHTB
Pressures: to 1500 psi
Capacities: 25 to 325 gpm
Temperatures: to 750°F.

Vertical, multi-stage diffusor-type unit. Single-suction impellers mounted back-to-back for axial hydraulic balance. Stuffing box under suction pressure.

For low capacities at high heads on process, boiler feed, hydraulic and similar applications.

CLASS VP
Pressures: to 750 psi
Capacities: 10 to 350 gpm
Temperatures: to 750°F.

Vertical, multi-stage, diffusor-type construction. Single-suction impellers with throttling sleeve balancing device to reduce axial thrust and provide suction pressure at stuffing box. Entire pumping element removable without disturbing suction and discharge piping.

For low capacities at medium high heads on applications such as process, boiler feed, and heater drain work.

Designed specifically for low-capacity high-head applications, these Ingersoll-Rand vertical process pumps are engineered with a background of process pump experience. They are manufactured in the most modern of pump plants to deliver years of efficient service with a minimum of down time and maintenance expense.

Features include: "Double-Case" construction with segmented diffusor-type inner casing for complete radial hydraulic balance and minimum bearing wear... Positive aligning feature for perfect positioning of inner casing segments... Rotor assembled without prestressing shaft to eliminate all possibility of shaft distortion. Available in bronze fitted, all iron, carbon steel, and stainless fitted materials to cover a wide range of process services.

Ask the Ingersoll-Rand engineer to show you these and other features which make Ingersoll-Rand pumps your best bet for low cost year-in, year-out service.

Ingersoll-Rand

10-376 **11 BROADWAY, NEW YORK 4, N.Y.**

COMPRESSORS • GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS • CONDENSERS • PUMPS • ROCK DRILLS • VACUUM EQUIPMENT

A FEW CCs CAN SAVE A LOT OF $$$

Chemical Pump set up to inject Kontol into finished product pipeline

Internal corrosion of pipelines results in the formation of corrosion products on the interior surfaces of the line. The presence of such corrosion products increases friction losses and decreases throughput. If pump pressures are increased to maintain throughput, pumping costs increase substantially. These corrosion products also contaminate and discolor refined hydrocarbon products. In addition, finely divided corrosion products are severely abrasive to machined parts of pumps, meters and the like.

Kontol Corrosion Inhibitors deliver hundreds of miles of protection for a few cents per mile. Protection generally is attained at a concentration of 2# of Kontol per 1000 barrels of hydrocarbon.

Kontol inhibitors are applicable to finished products lines, as well as crude transmission lines. By preventing corrosion, Kontol eliminates the many hazards caused by the products of corrosion. The lines are kept clean and free from fouling, eliminating the need for frequent scraping.

Kontol corrosion inhibitors are liquid organic semi-polar compounds, with solubility specifications to meet any need. Kontol adsorbs to the interior metal surfaces of pipeline equipment, forming an impenetrable film which prevents corrosion, scaling and fouling. Ask your Tretolite service engineer for complete information.

Chemicals and Services for the Petroleum Industry

DEMULSIFYING • DESALTING • CORROSION PREVENTING • WATER DE-OILING • PARAFFIN REMOVAL • SCALE PREVENTING

TRETOLITE COMPANY

A DIVISION OF PETROLITE CORPORATION

369 Marshall Avenue, Saint Louis 19, Missouri
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KPL 567

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WHEN YOU SAY GASO

- Gaso distributors know pumping conditions and how to meet them.
- They carry stocks of pumps and parts.
- They are Gaso-trained and service-minded.
- They bring GASO experience, facilities and products to your doorstep.
- *We are as close to you as our nearest distributor.*

GASO PUMPS
for every oil industry need

GASO PUMP & BURNER MFG. CO.
TULSA, OKLAHOMA
Export Office: 149 BROADWAY, NEW YORK

What happens to pipe wrap underground?

Here's what a federal agency found out*. . .

Many wrap and enamel combinations were imbedded in a test tank filled with bentonite clay slurry. Extreme soil stresses were imposed on these samples by alternate wetting and drying cycles. Resistance to backfill puncture was also checked after each cycle. Holiday-detection tests showed that the glass fiber and coal-tar combination stood up through the full 25 cycles of the test.

*As reported in Journal American Water Works Association, Vol. 48, Feb., 1956. Photo courtesy U.S. Bureau Of Reclamation.

These impartial tests show why BLUE FLAG gives you complete pipeline protection

It was conclusively demonstrated that glass fiber mat like Blue Flag, with coal-tar enamel, provides effective protection against *both* soil-stress and backfill-puncture action. (See picture caption above for actual test conditions.)

This is the kind of protection you need for maximum service life. Yet it's yours for only ¼ of 1% of initial pipeline cost when you use L·O·F Glass Fibers' Blue Flag.

No wonder glass fiber reinforcement like Blue Flag Pipe Wrap is preferred. It strengthens enamel . . . assures coating essentially free of holidays. And, Blue Flag helps speed application—its high tensile strength virtually eliminates breakage in the wrapping operation.

Yard-wrapped, or applied over-the-ditch, Blue Flag can be the answer to your pipeline protection problems. It's available from conveniently located distributor warehouses. For the address of the one nearest you, or for technical information, write: *L O F Glass Fibers Company, Dept. 72-77, 1810 Madison Avenue, Toledo 1, Ohio.*

L O F GLASS FIBERS

L·O·F GLASS FIBERS COMPANY • TOLEDO 1, OHIO

the INSLEY "pipeliner"

...tops in pipeline performance

THERE'S AN **INSLEY** WORKING NEAR YOU

Pipeline contractors know Insley as a dependable performer—a machine with "built-in" durability and stamina that will withstand the severe operating conditions of cross-country pipelining.

The Insley "Pipeliner" is fully convertible for hoe, shovel, dragline, clamshell and crane work, and is available with gasoline or diesel power.

INSLEY MANUFACTURING CORPORATION · INDIANAPOLIS 6, INDIANA

Save Money

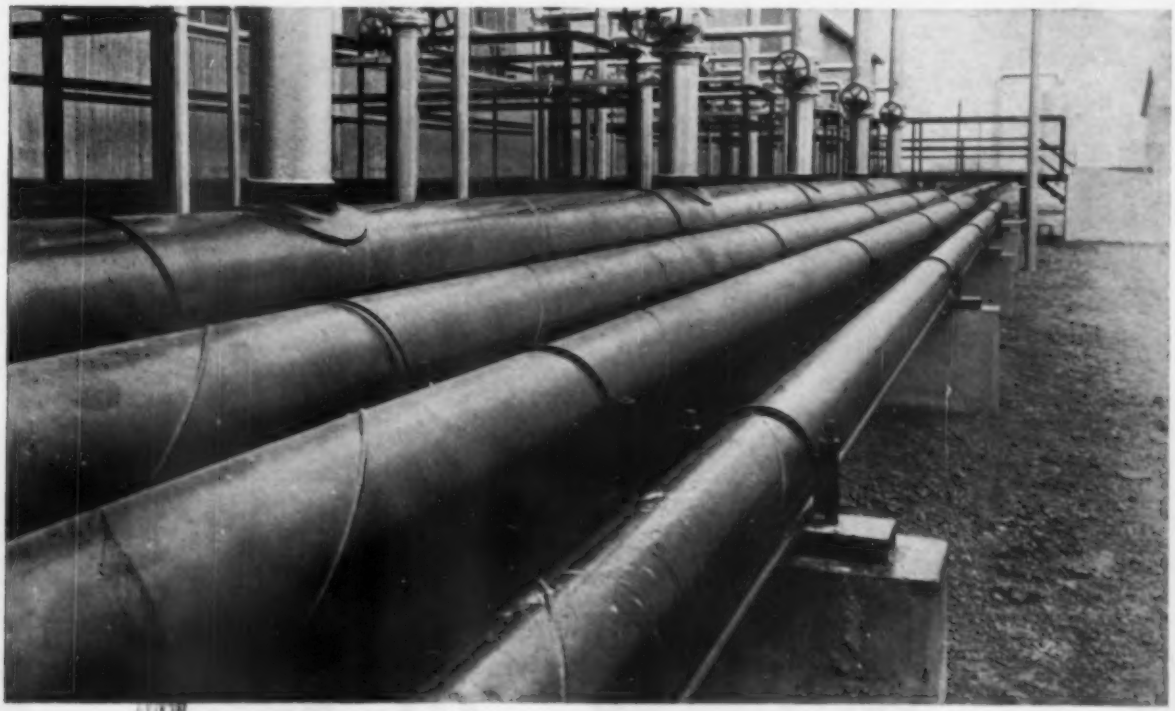
with pipe that fits your needs

Armco Pipe available in 132 different diameter-wall thickness combinations

When you install a pipe line or processing system there is no need to pay for unnecessary extra capacity, or for a heavier-wall pipe than you need. You can get Armco Pipe in 20 different diameters from 6 to 36 inches, and 10 different wall thicknesses from 9/64- to 1/2-inch. 132 different diameter-wall thickness combinations let you meet your needs without buying excess metal.

Write for Data

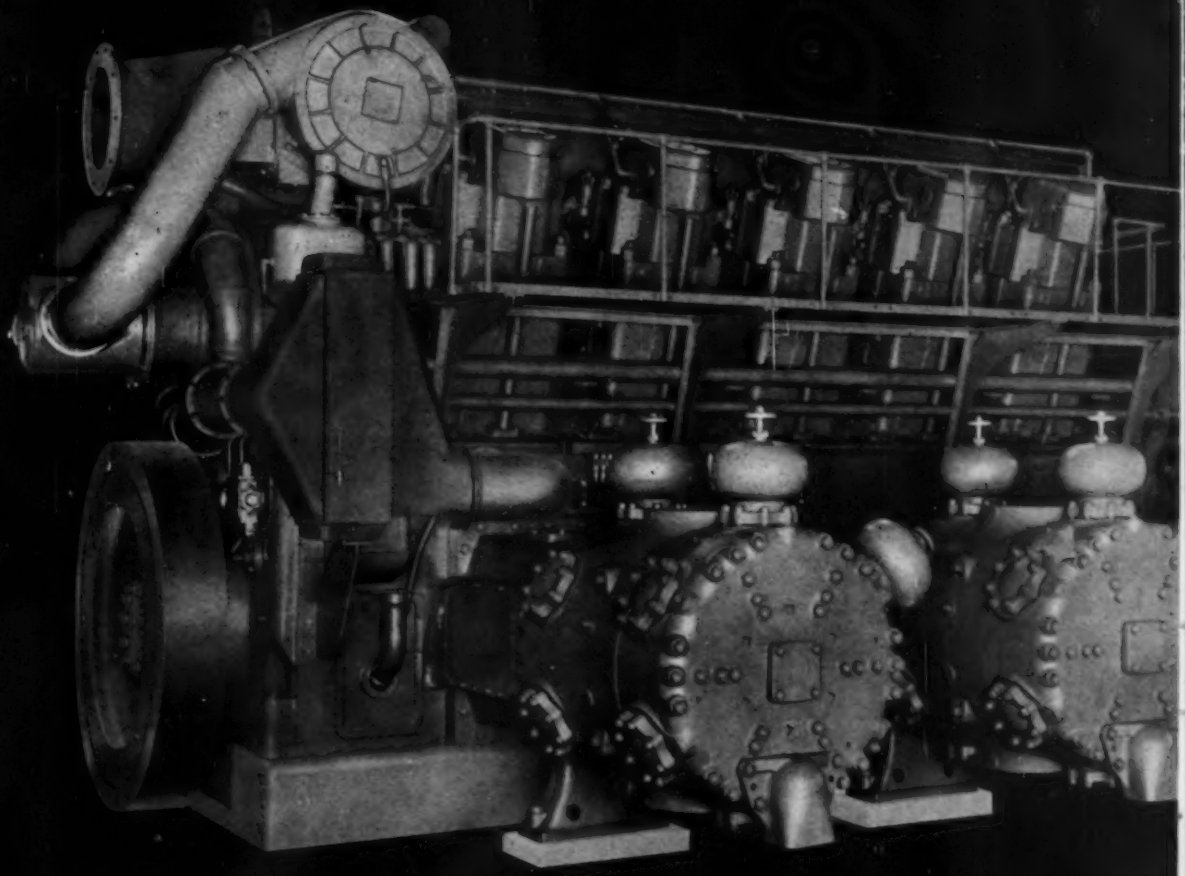
Write for complete data applied to your needs. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 4987 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.



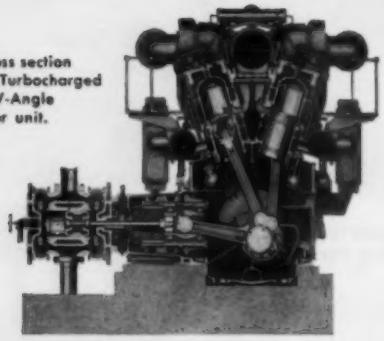
Specify Armco Welded Steel Pipe to meet requirements in the Natural Gasoline and Natural Gas Division, and wherever else you need dependable line pipe.

ARMCO WELDED STEEL PIPE

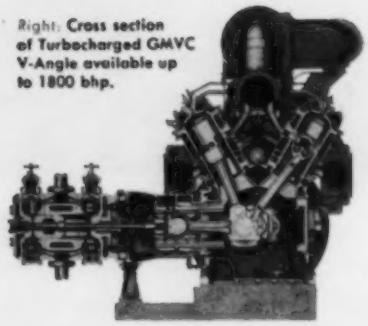
Full range efficiency....



Right: Cross section of Series Turbocharged GMWC V-Angle compressor unit.



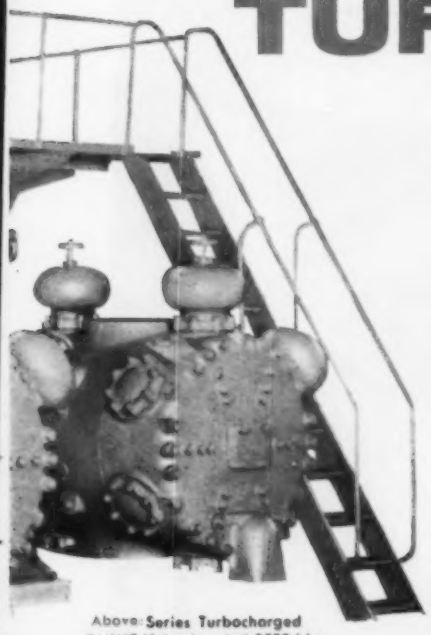
Right: Cross section of Turbocharged GMVC V-Angle available up to 1800 bhp.



with Cooper·Bessemer

SERIES TURBOCHARGED

V-Angle Compressors



Above: **Series Turbocharged GMWC V-Angle rated 3500 bhp at 250 rpm. The largest and most efficient available today.**

Remarkable gains in power output, fuel economy and power-to-space ratio, as important as they are, fail to reveal a key feature of Series Turbocharging. What about performance at start-up and at reduced speeds and loads? Here is one of the underlying factors in Cooper-Bessemer's development of this unique turbocharging system.

With both exhaust-driven and engine-driven turbo compressors operating in series, efficient supercharging is by no means limited to optimum full-load conditions. In fact, *at no time* is supercharging effect completely dependent on exhaust pressure or exhaust heat.

For further details on these and other unusual advantages featured by Series Turbocharged V-Angle Compressors, ask for Bulletin ST-82 . . . or contact the nearest Cooper-Bessemer office.

BRANCH OFFICES: Grove City • New York • Chicago • Washington San Francisco • Los Angeles • Houston • Dallas • Odessa • Pampa Greggton • Seattle • Tulsa • St. Louis • Kansas City • Minneapolis New Orleans • Shreveport

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Cooper Bessemer

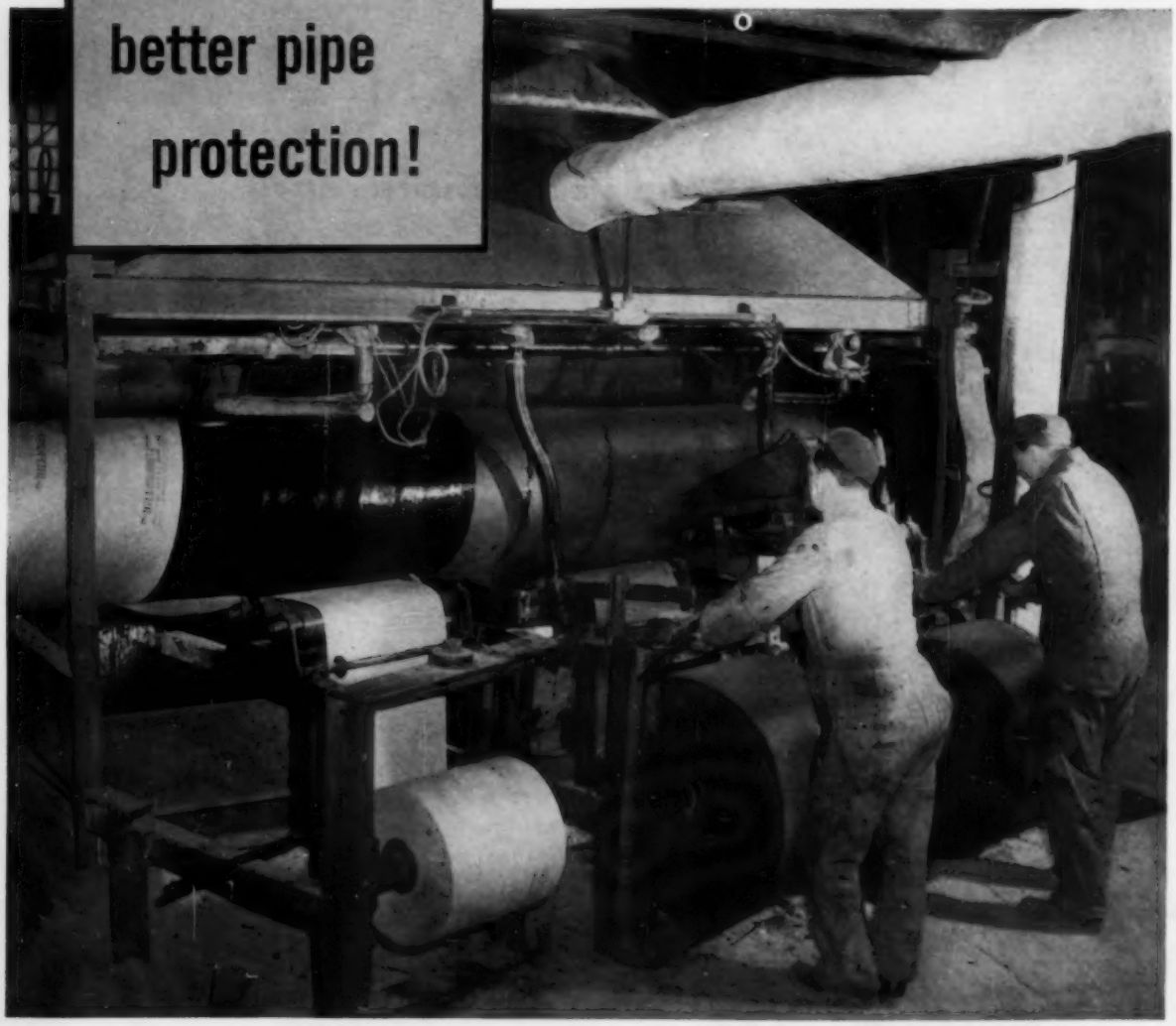
GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES: GAS - DIESEL - GAS-DIESEL
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL
ENGINE OR MOTOR DRIVEN

Here's where the tension mounts...for better pipe protection!

This remarkable machine is one big reason Hill, Hubbell leads in pipe protection. It is synchronized to 1) convey the pipe spirally at uniform speed, 2) apply to it the correct number and thickness of coatings, 3) adjust the overlap of various wrappings and, 4) actually adjust the tension on the wrappings so that the pipe is permanently protected!

This is another first by Hill, Hubbell, another reason to specify Hill, Hubbell wrapped pipe.

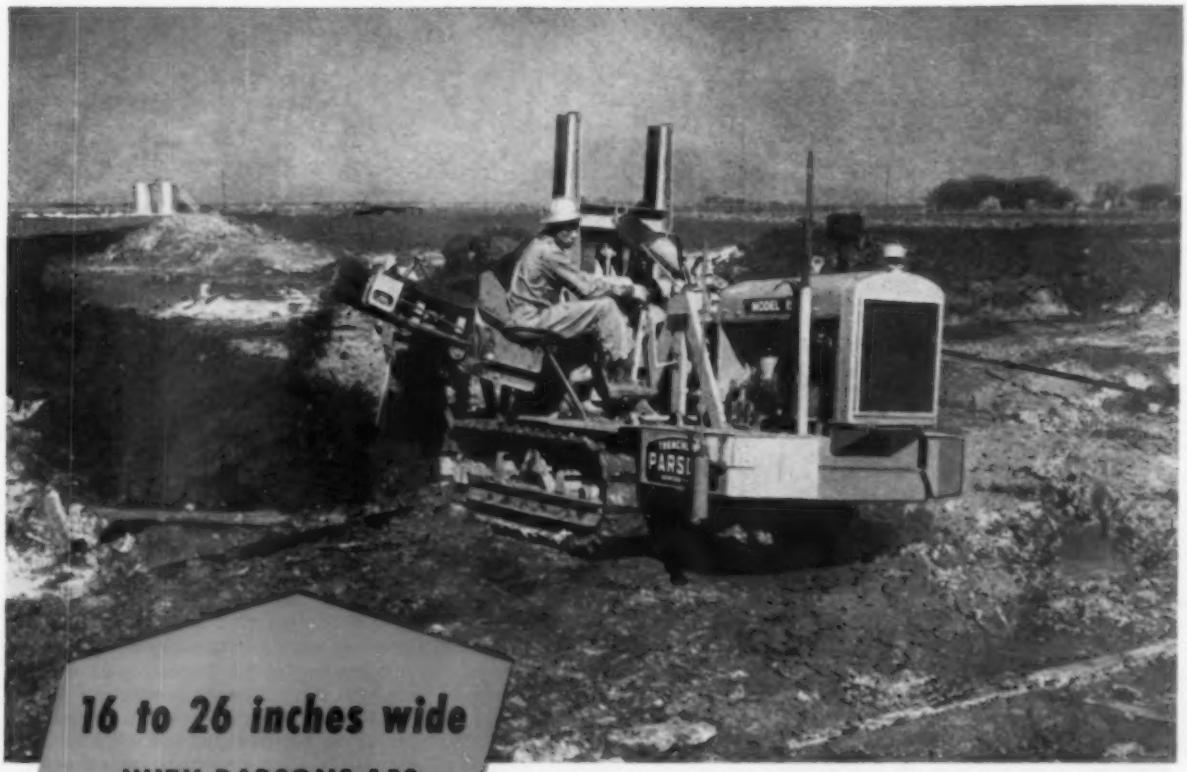


Specify Hill-Hubbell wrapped pipe on your next job

HILL-HUBBELL & COMPANY

DIVISION OF GENERAL PAINT CORP. • 3091 MAYFIELD ROAD, CLEVELAND 18, OHIO

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS



16 to 26 inches wide
WITH PARSONS 150

There is no need to dig and backfill excess yardages on feeder lines, laterals, gathering systems, etc. This medium-size wheel-type Trenchliner fills the bill on secondary lines — and has ample work range to handle a good share of your main-line trenching, too. You get cutting widths from 16 to 26 inches, depths to 5¼ feet with the Parsons 150. What's more, 30 digging speeds from 12 inches to 25 lineal feet per minute assure maximum production at every depth, width, in all soils.

You'll also like its precision grading accuracy. A hydraulic ram on vertical mast raises and lowers the digging wheel — gives infinite depth selections, maintains close grade tolerance even in toughest digging. A separate hydraulic ram tilts the mast, balances weight of wheel forward on the 150 Trenchliner when traveling or trailer-loading.

Heavy-duty wheel takes cast-steel buckets with self-sharpening, reversible "Tap-In" teeth, or quick-change gumbo buckets. Shiftable, reversible belt conveyor discharges spoil to either side. 16-inch crawlers, grouser-type shoes, provide plenty of digging traction with low bearing pressure for cross-country work. Let your Parsons distributor tell you more about it, or write for 150 Trenchliner catalog.

PARSONS COMPANY • Newton, Iowa
A division of Koehring Company

31 to 46 in. wide
with MIDDLE-INCH 420

For the big transmission lines, here's a Middle-Inch 420 Trenchliner, with cutting widths of 31 to 46 inches, depths to 7½ feet. Need still more capacity? Then check the Parsons Big-Inch 520, which digs 40 to 52 inches wide, 8½ feet deep. Both "Inchers" are wheel-type ditchers, formerly built by C-R-C. Parsons line also includes ladder-type Trenchliners — all sizes, from a small utility model on rubber tires to big, crawler-mounted models that dig up to 6 feet wide, 19 feet deep.

P786

TRENCHLINERS for PIPELINERS

Holiday Detection is an important step in checking a coating job before it goes below ground. But it's *after* the line is laid that the real test of how well the coating material will withstand the attack of water and soil chemicals begins. That's why coal-tar enamel is used on most important pipelines: it has proved its ability to provide long-term protection of pipeline investment.

Concrete "Corrodes," Too, under the attack of acid or alkaline solutions. Sewer pipe made of concrete is especially subject to deterioration: that's why Hoboken, N. J. is having its new sewer line protected, inside and out, with two coats of Bitumastic Super Service Black.

New Bulletin describing the important role of protective coatings in preventing corrosion is available. Request your copy by coupon below.

Koppers Company, Inc.
Dept. 105-G
Pittsburgh 19, Pa.

Please send me "The Fight Against Corrosion."

Name_____

Company_____

Address_____

City_____ State_____

how to
CUT CORROSION LOSSES
a report by Koppers Company, Inc.

Number 10 of a series

Dr. W. F. Fair, Jr.
Corrosion Consultant

Since the security of a multi-million dollar investment is at stake, preventing corrosion in buried steel pipelines is extremely important. In this field the decisions made as to corrosion-prevention practice in the *design* phase are irrevocable—and can prove tremendously expensive if wrong.

* * *

Hot applied coal tar enamels have been traditionally the primary part of the protection system on pipelines. In recent years, cathodic protection has become widely accepted as a supplement to coatings.

Enamels must now be judged as much on their value as long-term insulating materials as on their ability to prevent corrosion.

* * *

The best clue to a coating's performance is its ability to resist penetration by water. It is this inherent characteristic that determines a coating material's performance underground, with or without supplementary cathodic protection. As a coating absorbs water, it provides a decreased resistance to the flow of electric current between pipe and soil which is part of the corrosion process. Ultimately, water absorption leads to coating deterioration, which exposes bare pipe. In conjunction with cathodic protection, the coating system's most important function is that of a long-lasting electrical insulator so that impressed current requirements are kept to a minimum. Here too, a coating system's resistance to water penetration determines its performance. Actual pipeline operating experience has shown that the cost differential between maintaining cathodic protection on well and poorly insulated lines can amount to hundreds of thousands of dollars yearly.

* * *

Independent laboratories and industrial researchers have expended considerable time and effort in determining water absorption rates of protective coatings. Long-term tests have demonstrated, without exception, that coal-tar enamels have the highest resistance to water absorption among protective coating materials commercially available today.

The key to a coating's ability to resist water absorption seems to depend on the inherent molecular structure of the base material. The relative performance of a number of coatings in these various tests indicates that coating impermeability depends upon *aromatic content*. Coal tar enamel binders with an aromatic content in excess of 90%, show excellent water resistance in all tests while less aromatic materials show comparably poorer performance. Materials high in paraffinic content have been shown to leach under extended immersion.

* * *

An audio-visual meeting presentation discussing this important subject in detail is available. If you are interested in having a group-showing of this material—which includes a sound film—please address your inquiries to "How Long Should A Pipeline Last?," Koppers Bldg., Pittsburgh 19, Pa. or to Koppers District Offices: Boston, Chicago, Los Angeles, New York, Pittsburgh and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario, and Edmonton, Alberta.

KOPPERS

BITUMASTIC
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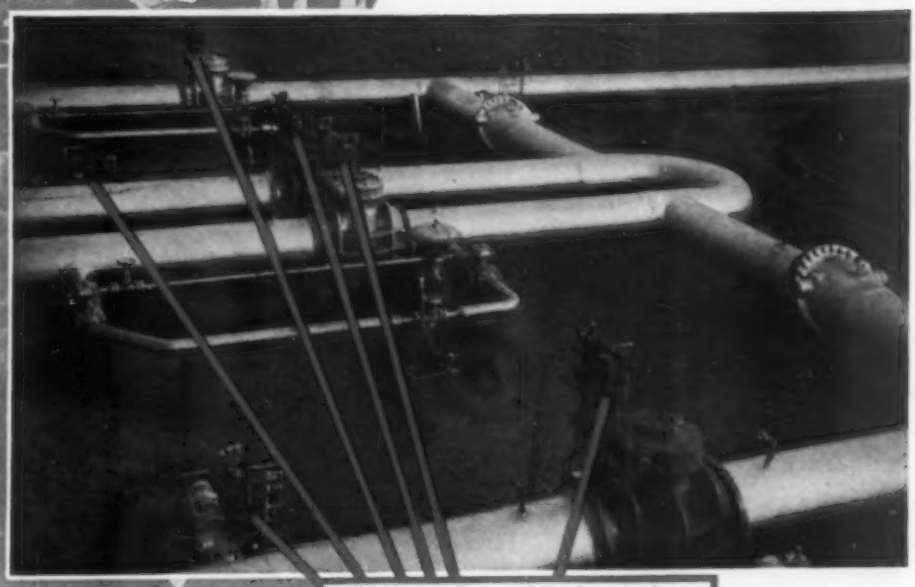
COATINGS AND ENAMELS

THE E.I.M. FIREMEN



All E.I.M. Installations of This Type Conform With "Emergency Shutdown Facilities" (No. 843.431 Section B, ASA B31.1B-1955)

EVERYWHERE AND ANY TIME THERE'S A FIRE EMERGENCY— YOU'LL FIND THE G-2 CONTROLLING THE SITUATION

EIM G-2 valve controls guide the flow of gas through compressers where the pressure is increased.

With a breach in the line there comes a marked reduction in pressure which, within a matter of seconds, automatically closes the G-2 valve control and re-routes the gas through an undamaged line. In addition to this, a vent valve in the affected area is opened sending a jet of gas from the damaged line spewing harmlessly into the air, thus reducing fire losses to a minimum.

G-2 valve controls stand watch twenty-four hours a day in silent protection of life, limb, property, and our valuable natural resources.

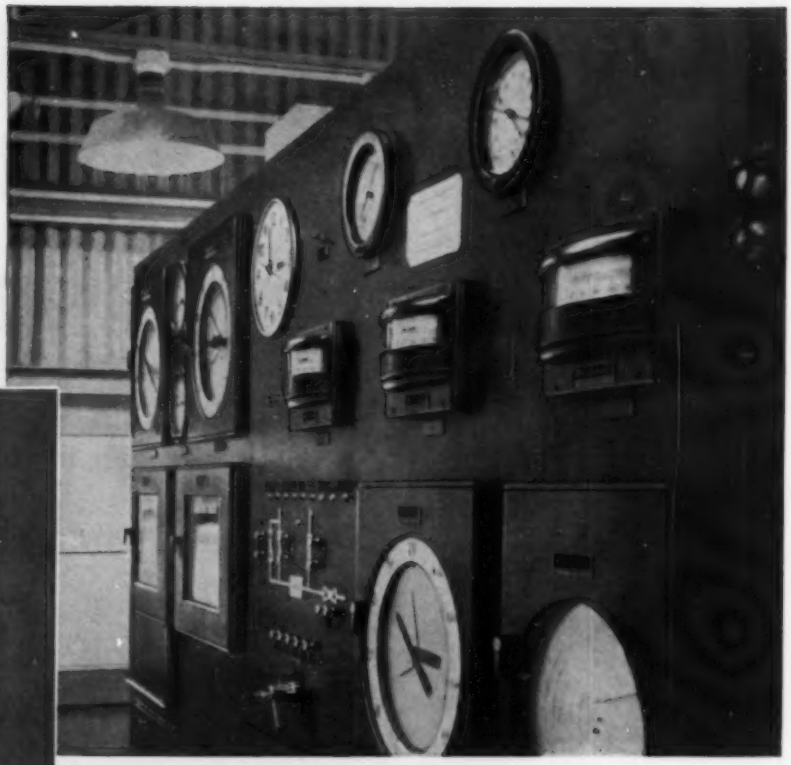
E-I-M *Company* INCORPORATED

1340 OLD SPANISH TRAIL
HOUSTON 25, TEXAS • MOhawk 4-4587

Valve Controls • Speed Reducers
Cooling Tower Drives • Control Valves

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD

This control panel at the Stanton satellite station permits fully automatic control—remote or local—including automatic alarm, startup, and shutdown.



At Gulf Interstate Gas Company's master control station, Nashville, Tenn., a section superintendent presses a button—shortly the satellite station at Stanton, 210 miles away, goes onstream, under full automatic control.

First satellite compressor station —completely automatic—

with HONEYWELL *instrumentation*

OPERATING completely unattended, Gulf Interstate Gas Company's satellite compressor station at Stanton, Ky., marks an important milestone in gas transmission.

The station has operated without a hitch since its completion early last year. Test results showed savings of 10 to 15% in operating costs . . . better control over line and delivery, especially during peak demand periods . . . dependability and safety, affirmed by FPC approval. This remarkable performance has encouraged Gulf Interstate to add four more satellite stations to its 1,160-mile system.

Much of the success of the satellite station is due to the fine degree of automatic control made possible by Honeywell instrumentation at the satellite and at the master control station at Nashville—210 miles distant. The satellite control system, designed for both local and remote automatic operation, includes Honeywell suction and discharge pressure controllers, and a completely automatic gas engine cooling tower control system.

Gulf Interstate's faith in Honeywell instrumentation has been borne out by the absolute reliability and accuracy so necessary in an unattended station.

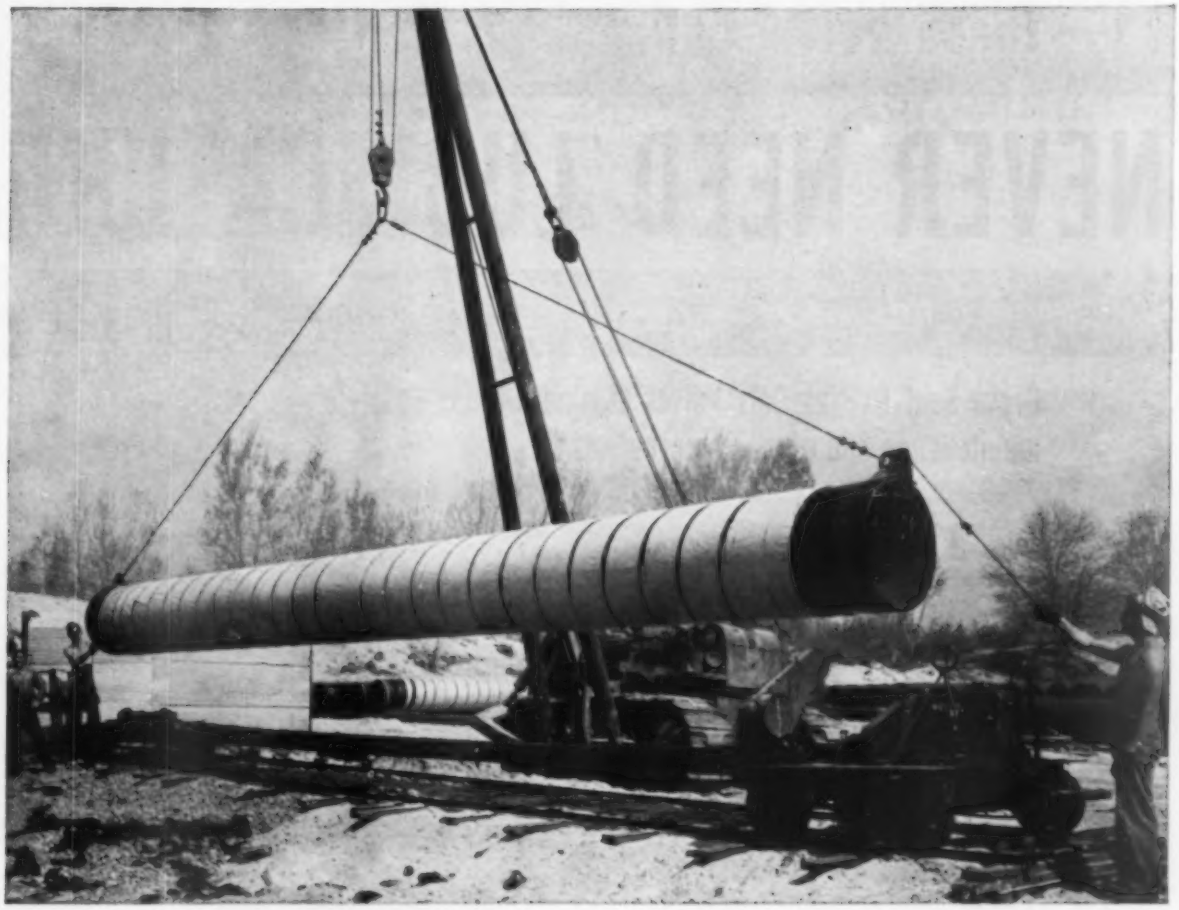
Your nearby Honeywell sales engineer can show you how to apply instrumentation to advantage in your own operations. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

MINNEAPOLIS **Honeywell**

BROWN INSTRUMENTS

First in Controls



ANOTHER LINK IN A MILLION-MILE CHAIN

This 30-foot section of pipe has been coated, wrapped, and is ready for service. It will take its place in the vast underground pipeline network that moves a greater volume than do trucks, railroads, ships and planes, combined.

It will become part of a great subterranean system that is vital to America's everyday living.

Let the facts speak for themselves. The gas industry alone handles over 10,000,000,000,000 cubic feet daily through more than half a million miles of transmission and distribution pipelines. A 185,000-mile pipeline system moves liquid petroleum products across the continent. In addition, there are many thousands of separate pipeline systems used to transport steam for power and heating —and to deliver water through municipal piping.

But there are problems—and one of the most important of these is corrosion. Pipeline companies and utilities must protect their metal pipe against the many corrosive elements that exist underground.

That's where Dearborn comes in. Dearborn's complete line of NO-OX-ID Coatings and NO-OX-IDized Wrappers provide both chemical and mechanical protection against moisture penetration and soil action—protection that lasts for decades—under ground or under water. That's why leading pipeline companies and utilities everywhere look to Dearborn for long-term protection against corrosion leaks and deterioration.

We will gladly consult with your engineers on the best NO-OX-ID Coating and Wrapper Combination for your next pipeline job.

SPECIFY

Dearborn NO-OX-ID®

ON YOUR NEXT PIPELINE JOB

USE THE COUPON FOR MORE INFORMATION

Dearborn Chemical Company, Dept. PE
Merchandise Mart Plaza, Chicago 54, Ill.

☐ Please send details on NO-OX-ID Combinations.
☐ Have representative call.

Name.....*Title*.....

Company.....

Address.....

City.....*Zone*.....*State*.....

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD

These valves will

NEVER NEED "LUBRICATION"

Grove Seal-O-Ring Gate Valves eliminate these costly maintenance and operating problems:

- No lubricants or sealing compounds needed
- No time or labor wasted in lubrication
- No sticking due to loss of lubricant
- No leaking from failure to lubricate
- No damaged gates or seats caused by improper lubrication
- No contamination of product or fouling of adjacent metering or control equipment

The squeegee action of the exclusive *Seal-O-Rings*, which are always in contact with the gate, wipes both sides immaculately clean. This maintains precision factory finish on the sliding surfaces, insuring full freedom of movement – without need for lubricants or sealing compounds. Bearings and stem seals are factory packed for a lifetime of normal service. For 2" to 36" lines – for oil, water, gas – specify *Seal-O-Ring*, the gate valve that's proved it can take care of itself year in and year out.

704

Write for colorful new Pipeline Valve Bulletin No. G-571

GROVE SEAL-"O"-RING Gate Valves

SUBSIDIARY OF WALWORTH

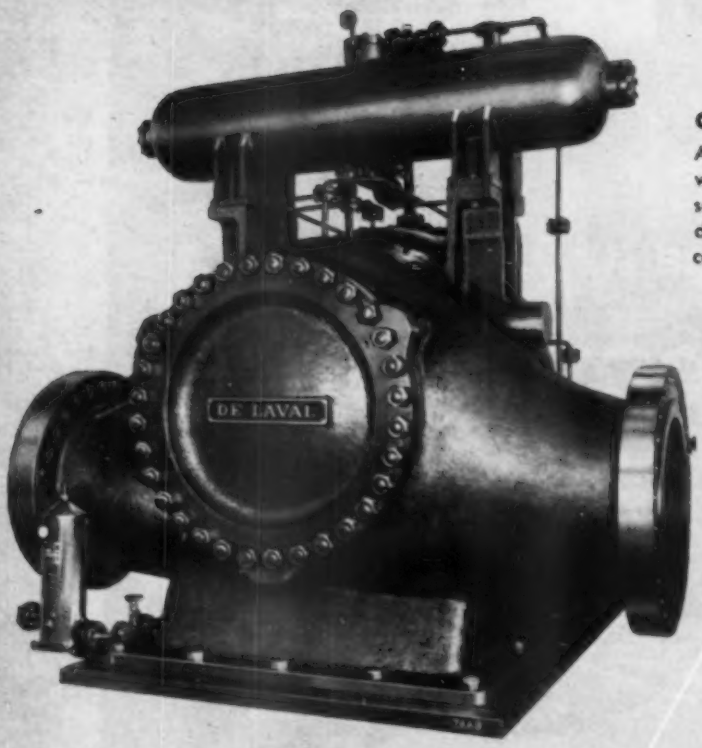
GROVE VALVE and REGULATOR COMPANY • 6529 Hollis St., Oakland 8, Calif.
HOUSTON 23—3517 Polk Ave. • • • • • **LOS ANGELES 6**—1930 W. Olympic Blvd.

GROVE SEAL O RING ® GROVE SIMPLICITY ACCURACY SAFETY

ODESSA, TEXAS • TULSA, OKLAHOMA • CHICAGO, ILLINOIS • DENVER, COLORADO • In Western Canada: GROVE VALVE LIMITED, EDMONTON

DE LAVAL
CENTRIFUGAL PIPELINE COMPRESSORS

come in two "packages" for easy installation



COMPRESSOR

A De Laval compressor with its emergency seal tank mounted directly on the compressor.

CONSOLE

The console contains the filters, motor-driven pumps, coolers, pressure switches, gauges and other accessories. It eliminates complicated piping on the packaged compressor . . . also serves as a protective cover for the equipment it houses.

Bulletin 503 gives data on De Laval centrifugal pipeline compressors. Write for your copy.

Designed in two packages, rugged De Laval centrifugal compressors offer many important engineering features. Among these are • high pressure contact shaft seal which eliminates gas leakage • heavy and rigid construction throughout • high load carrying capacity. The compressor and console arrangement makes De Laval centrifugal compressors easy to install—only simple low-cost foundations are required. De Laval units, totaling more than 280,000 horsepower, are now in operation on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
869 Nottingham Way, Trenton 2, New Jersey

DL-3a

These valves will

NEVER NEED "LUBRICATION"

Grove Seal-O-Ring Gate Valves eliminate these costly maintenance and operating problems:

- No lubricants or sealing compounds needed
- No time or labor wasted in lubrication
- No sticking due to loss of lubricant
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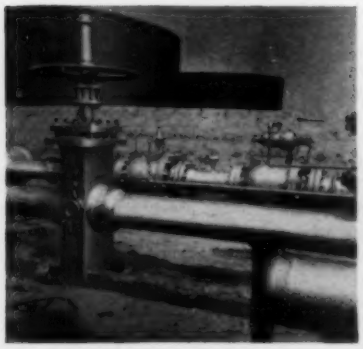

GROVE SEAL-"O"-RING Gate Valves

SUBSIDIARY OF WALWORTH

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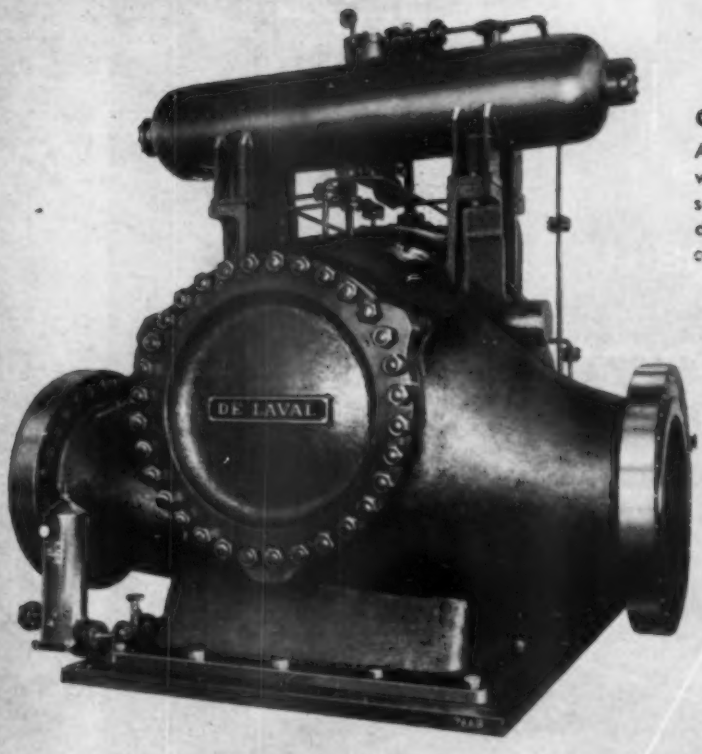
DE LAVAL
CENTRIFUGAL PIPELINE COMPRESSORS

come in two "packages" for easy installation



COMPRESSOR

A De Laval compressor with its emergency seal tank mounted directly on the compressor.

CONSOLE

The console contains the filters, motor-driven pumps, coolers, pressure switches, gauges and other accessories. It eliminates complicated piping on the packaged compressor . . . also serves as a protective cover for the equipment it houses.

Bulletin 503 gives data on De Laval centrifugal pipeline compressors. Write for your copy.

Designed in two packages, rugged De Laval centrifugal compressors offer many important engineering features. Among these are • high pressure contact shaft seal which eliminates gas leakage • heavy and rigid construction throughout • high load carrying capacity. The compressor and console arrangement makes De Laval centrifugal compressors easy to install—only simple low-cost foundations are required. De Laval units, totaling more than 280,000 horsepower, are now in operation on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
869 Nottingham Way, Trenton 2, New Jersey

DL-3a

COMPLETELY

MECHANICAL–

FULLY RELIABLE

Barton Model 236 Flow Meter
Combines Barton Model 199 rupture-proof bellows unit with Librascope Flow Computer. No cams, intermittent devices with built-in switch for remote reading.

Librascope's pressure-compensated, totalizing flow computer

HIGH ACCURACY

MADE POSSIBLE

THROUGH

CONTINUOUS

INTEGRATION

Streamline Gas Flow Computation with the Direct Reading Flow Computer

Simplify your computations, too, in orifice measurements. Unique in design, the *Librascope Flow Computer* is a new development, embodying a principle that gives pressure-compensated flow measurement through double integration. In action, the Flow Computer automatically extracts the square root and continuously integrates both differential and static pressures. The continuous total is displayed on a direct reading counter; an electrical pulse output is also provided for remote display.

With the Librascope Flow Computer, operating costs are lowered, and the frequent inaccuracies of hand integration are eliminated. The Flow Computer is ideally suited to flow measurement problems involving rapidly fluctuating flow. Computing accuracies are maintained over the full frequencies range of the input device. Measuring flow in gas lift, gas well, and gas transmission problems are accurately and reliably solved with the *Librascope Flow Computer*. The Flow Computer is designed to fit on new or existing meter installations. Several models are available, together with optional equipment and installation kits. *Write for data and bulletin.*

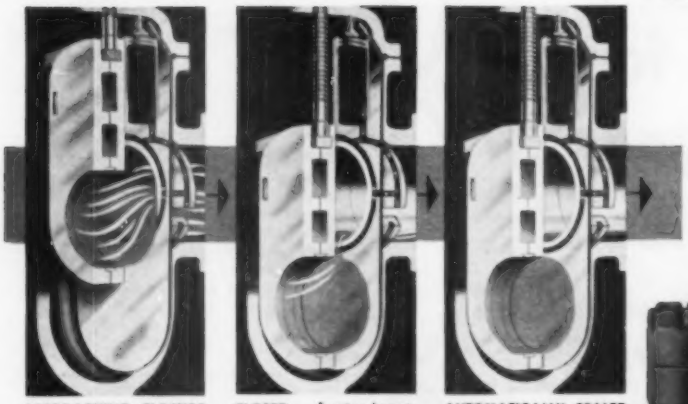
For 20 years one of the leading manufacturers of computers, controls, and components for Government and Industry.

LIBRASCOPE

LIBRASCOPE INCORPORATED, 133 EAST SANTA ANITA AVENUE, BURBANK, CALIFORNIA

For pipeliners who hate leaks!

DARLING-McEVOY SELF-SEALING CONDUIT VALVES



APPROACHING CLOSURE ... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

CLOSED ... *Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

AUTOMATICALLY SEALED ... *Pressures again in balance. Tightness established. No additional sealant used until again needed.*

THE DIAGRAMS above show how these unique conduit gate valves seal themselves *automatically* . . . by means of a long lasting reservoir-held sealing compound . . . for leak-proof, pressure-tight closure every time! This feature, with flow in either direction, self-aligning non-wedging gates, and fully protected non-distorting seats, means exceptional performance, utility and service life. For additional information on these fully field-proved Darling-McEvoy valves, ask for Bulletin 5402.

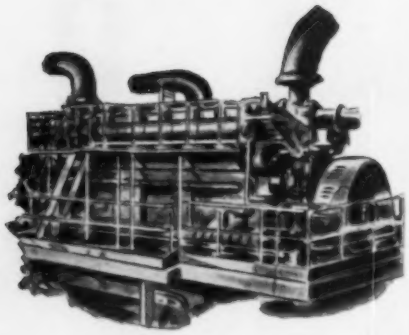
DARLING VALVES

DARLING VALVE & MANUFACTURING CO.

Williamsport 12, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Company, Ltd., Galt 19, Ontario

FOR FURTHER INFORMATION ON ADVERTISED PRODUCTS, SEE READER SERVICE CARD



Here's why it pays to

Call on Koppers for the Answers to your Piston Ring Problems

American Hammered Piston Rings are made in every size • of every type • for every purpose

Every Diesel and gas engine presents a different piston ring problem. So it pays to go to the source that can look for the answer from every angle . . . Koppers American Hammered!

In one completely modern plant, American Hammered produces rings for every industrial application . . . in sizes ranging from less than one inch to ten feet in diameter. Ready to serve you are large foundries equipped for both static and centrifugal casting . . . a modern heat-treating plant . . . one of the largest and most up-to-date chromium plating plants . . . modern machine shops . . . an efficient engine test laboratory . . . a modern and complete piston ring research laboratory!

Outstanding product quality, assured by trained metallurgical and engineering staffs . . . supplemented by field engineers, thoroughly familiar with ring applications . . . results in efficient service and analysis of your specific problems. Write, wire or phone for experienced help on your piston ring problem! KOPPERS COMPANY, INC., *Piston Ring Dept.*, 1715 Hamburg Street, Baltimore 3, Md.

COMPRESSION RING is a one-piece, quick-seating piston ring. One-piece construction gives maximum strength. Turned finish on outside diameter enables ring to conform readily to cylinder bore. Chemically treated surfaces promote rapid seating with freedom from scuffing or scoring during run-in. ½" to 120" diameters.

POROUS CHROMIUM PLATED piston rings are manufactured by the exclusive Van der Horst process. Produced with a shallow porosity on the cylinder contacting surface, this ring facilitates break-in, holds and distributes oil during this critical period. Lasts four times longer and cuts cylinder wear up to 75%. ½" to 42" diameters.

CONFORMABLE OIL RING maintains constant unit pressure for positive oil control. Conforms readily to meet cylinder distortion because flexible cast iron member is pressed outward by abutment type spring which exerts uniform radial pressure around entire circumference. 4" to 25" diameters, ¼" min. width.

KOPPERS SEAL RING has either one or two projecting bands of bearing bronze inserted in its cylinder contacting face. High unit pressure on narrow bronze bands takes quick initial seat, tends to prevent blow-by in both new or worn cylinders. Burnishing action of bronze on cylinder walls decreases scuffing and wear. 2" to 30" diameters.

GROOVED OIL CUTTER RING has been adopted as standard equipment where oil control has previously been a major problem. Unique design incorporates two bevels for riding over oil on upstroke, two scraping edges for removing excess oil from cylinder walls on downstroke, plus a series of wide drainage slots. 1½" to 25" diameters.

PLUS RING MATERIALS to fit every need, such as: K-IRON®, a high grade, closely controlled, individually cast grey iron used in majority of applications . . . and K-SPUN®, a malleable type iron, centrifugally cast for applications requiring high strength, high elastic modulus and superior impact resistance.

KOPPERS

AMERICAN HAMMERED
Industrial Piston Rings

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE, MD.

Progress in Tools Paces Progress in Pipelining

Problem of mounting costs is solved with improved equipment and better techniques

Frank H. Love
Editor

TODAY, the touch of a button can start or stop an engine, open or shut a valve, gage a tank of oil in a matter of seconds. Once, each of these operations required a considerable number of minutes on the part of several workmen.

Who hasn't seen an early day picture of 40, 50, or more men with shovels digging a pipeline ditch. Even with this manpower the daily footage was extremely limited. Today, with wheel-type trenchers virtually any desired footage can be attained.

These are but simple examples that serve to emphasize the great progress that pipelining has made within a relatively short span of time.

Construction

A vital factor in pipeline construction is the speed with which a project can be completed. On this, often, hangs the key to profit or loss. And equipment has been designed toward this end.

One of the most recent developments has been a fully automatic welding process for double-jointing pipe in the field. The system was used for the first time on the Trans-Canada Pipe Line and is said to be cutting welding time in half.

Equipment for backfilling from the spoil bank in rocky areas, introduced about a year and a half ago, seems to be working out well. Time required to haul in dirt with which to pad the ditch and for initial cover of the pipe to prevent damage to coating is thus saved. In some areas this was a major problem.

Coloring the overall construction picture has been the continued progression to the use of larger and larger diameter pipe, to provide greater throughput and economy of operation. This has resulted in larger equipment with more power.

Line pipe itself is constantly undergoing development. With the economy of large, thin-wall pipe definitely established, emphasis is being placed on development of pipe manufacturing processes to provide pipe with the strength necessary for pipeline service. Chemistry of steel has made great strides in this direction and pipe of, say, 30-in. diameter capable of withstanding pressures of 1200 to 1500 psi, but still not of excessive weight, is within the foreseeable future. In fact, it is asserted by metallurgical experts that an extra tough steel that will make even larger diameter pipe possible is nearing final stages of development.

In the search for improved materials considerable experimentation has been given to plastic and aluminum pipe. Both of these materials have been installed in certain pipeline services, gathering lines, for example, but their inability to take the high pressures demanded have made them impracticable for main line transmission use.

This does not mean that such will always be the case. It is thought possible that ordinary plastic can be strengthened to the necessary degree by atomic radiation. When this is done, it is also visualized that plastic pipe can be extruded over the ditch and laid immediately. The speed of pipeline construction by this method would be fantastic by present standards. The idea may be fantastic, too, but we wouldn't term it so in this day and age of rapid progress.

Pipe Protection and Maintenance

The trend to thin-walled pipe has emphasized the necessity to give it better protection. One result has been the constant improvement in coatings, which has added strength to the pipe and protected it from corrosion.

Improved materials and better techniques for internal coating of pipelines is a factor not to be overlooked. So far internal coating of pipelines has been on a limited scale. It could well attain a greatly accelerated pace, as it not only is a means of giving extended life to the pipe, but provides greater flow efficiency.

Protection against corrosion has reached a high degree of accuracy and an enviable record of efficiency. On some points corrosion engineers still have their areas of disagreement. This indicates there will continue to be progress, as in all phases of pipelining.

Although anodes and rectifiers serve well to protect pipe against electrolysis, some thought is being given to the use of solar batteries in isolated areas where there is no electric power available and where inaccessibility presents a real problem for any kind of electrical protection. The appeal of a solar battery or generator, which has been used successfully to power telephone circuits, is in the fact that it requires no upkeep or fuel.

Offshore Pipelines

Already 1450 oil and gas wells are producing in waters off the coasts of Louisiana, Texas, and California. Latests statistics show that there are 115 drilling rigs in operation. These figures reveal the extent of offshore oil and gas development. Offshore pipelining must grow, and has grown, in comparable proportion.

The two techniques for laying pipelines underwater are: (1) from a barge, and (2) the push or pull method. When the latter system is employed the pipe usually is held off bottom by means of buoys.

Within recent months a barge has been launched, designed and built especially for laying lines in open waters. Construction of another has just been

announced. These barges, in addition to being fully equipped for pipe laying, also have living quarters for crew members, hospital facilities, etc.

Operations

It has been suggested that ultimately a pipeline system may be one of complete automatic operation. This scarcely seems logical in the purest sense, because there will always be buttons to push and someone will have to push them. It does indicate, however, the direction in which pipelining is going. Automatic operations in minor forms have been with us for many years. Only within a comparatively few years, however, has the forward progress been so rapid.

Automation has many benefits. It eliminates human error, which is another way of saying operations are more accurate. As a result of time saving, manpower is reduced. The end result is maximum throughput at minimum operating expense.

Remote station operation, automatic sampling, monitoring, protective devices, gaging, metering, lease custody transfer, digital computers, are but a part of the components grouped under the general term automation. Usage is newer with some than with others. Automatic machines for making engineering calculations, saving as they do thousands of manhours, especially have come into growing favor. The trend is toward the larger more complex machine with large storage capacity. They are more versatile and can solve more complex engineering problems. Smaller computers, however, can be used to solve many engineering problems, and this type, too, is becoming quite popular with pipeline people.

Lease automatic custody transfer is fast winning its spurs. Introduced only about a year and a half ago, its value was a moot question for some time because of doubt on the part of some regarding the accuracy of oil metering. This doubt has now almost dissolved, apparently, and there are now a number of installations in operation. This automatic gaging system takes into consideration many factors in arriving at an accurate measurement, such as temperature, gravity, and foreign matter present in the crude.

Microwave

Perhaps it is inaccurate to say that without microwave, automation on pipeline systems would be impossible. Doubtless other means of implementing automatic operations could be found. It is questionable, however, whether they would be as efficient or effective. Microwave is looked upon as the most important recent development in communications. It provides numerous channels for use as telephone circuits, to operate teleprinters, for telemetering, and supervisory control.

What About Television?

Television is proving to be more than an entertainment medium. Several lines of industry have found applications for it, and one of these is the pipeline industry. So far very limited, but it is a beginning and conceivably will expand. Certain pipeline operations are being watched through closed-circuit TV. Because unmanned booster stations are becoming more and more the order of the day, it is important that personnel at the supervisory station or division office know the extent of damage should something go wrong with equipment. A buzzer or howler informs of trouble, and in the few instances where closed-circuit TV systems have been installed, a look can be taken at the damage through this medium.

Patrolling with Helicopters

An interesting development, too, is the growing use of helicopters for spotting leaks. A vast improvement over the linewalker was the use of the airplane. It is still the most used method for patrolling pipelines. Some companies, however, are experimenting with the helicopter. Even a small slow speed airplane is sometimes too fast for the "linewalker" to be certain about a leak and he would like to take another look. The helicopter gives the operator more time to spot leaks and he can hover over the spot if he wishes to make certain of his suspicions.

Mounting construction and operating costs in recent years have made it doubly necessary for management to take a long look at all factors involved in operating a pipeline system. Techniques must be carefully considered, and this is certainly true of equipment.

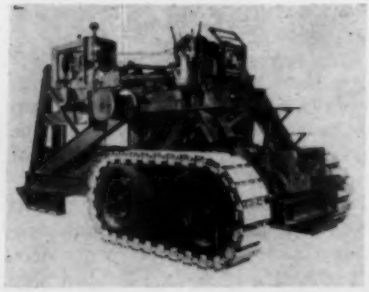
* * *

What's New in . . .

Pipeline Equipment

Leading manufacturers and pipeline suppliers report their latest developments.

CONSTRUCTION



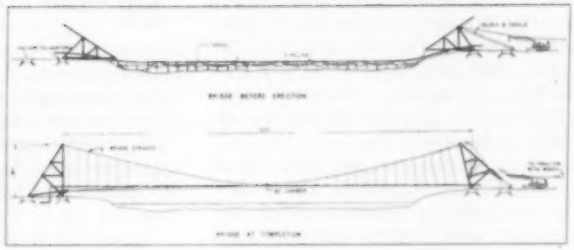
Pipe Bender Under 8 Ft Wide

315 Crutcher-Rolfs-Cummings, Inc. has announced a new vertical pipe bender for cross-country pipeliners. New CRC Bender, Model B, is more powerful than its predecessors, yet takes up less room because it is under 8 ft wide for transporting on highways. Another feature is new tandem-axle, pneumatic mounting for increased mobility. Rubber tires or Athey Tracks are optional on each machine. Detachable track pads are available for fitting over the tires.

The benders will be built in 3 sizes to handle up to 20, 30 and 36-in. pipe.

More bending power is attained by large, needle-bearing, mounted cable sheaves, and a tilted front mast to give a stronger vertical bend pull. Bending speed is thereby increased.

Crutcher-Rolfs-Cummings, Inc.



Pipeline Bridge Hoisted in Place

316 The Clear Span Pipeline suspension bridge is a new development of simple design and easy construction.

Component parts of the suspension tower which is welded together in an overturned position are prefabricated at the site and later used to hoist the bridge. Structure can be completed in about 3 weeks time by an 8-man crew using very little equipment. This results in saving of time and labor, bringing the Clear Span Pipeline bridge into the comparative cost range of the ordinary submarine river crossing, with much less maintenance cost involved.

"Galloping" and harmonic vibration have been eliminated and the bridge may be raised or lowered in an hour or so enabling even trifling adjustments to be made during erection or after completion.

One of the design features of the suspension bridge is its foundation advantage. A new spread type of foundation is employed. This type of foundation has been used successfully in many applications.

Structurally, the bridge is designed with a safety factor of four. Design is by the Clear-Span Engineering Company.

The Vinculum Corporation

Digger for Ford Tractor

317 A completely new power digger for mounting on Ford tractors has been introduced by Sherman Products, Inc. Unit supercedes earlier Sherman models for the smaller Ford tractors and embodies many features never before available in such equipment.

Thoroughly tested in field operations, the F Model Sherman has been subjected to more than half a million cycles of digging in hard dry clay and frozen ground at accelerated pump speeds and high pressures. This test is equivalent to 2 years of normal operation in hours, nearly 5 years operation in terms of fatigue producing factors.

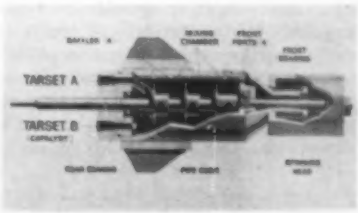
Several outstanding features develop the speed of the new Sherman unit, according to Sherman engineers. One is exceptional power as illustrated by a breakaway capacity of 9000 lb. Another factor is the pump drive from the tractor PTO at the rear, which through an exclusive planetary transmission develops greater digging speed. A hydraulic system pressure of 2000 psi also speeds operation work.

Wide work radius and a long reach, the Sherman F can excavate a trench 15 ft, 8 in. long from just one tractor position. Arc of swing is 188°. Reach below grade is 12 ft, and loading height, 9 ft, 2 in.

Even the hydraulic stabilizers are of a new design. Individually controlled, they have a spread of 8 ft and give both lateral and angular support for maximum stability on sloping and uneven ground. They fold to less than tractor width for transporting. A large diagonal spade and web with a 12 by 14-in. plate assures wide contact even in soft soil. The digger can be dismounted from the tractor or mounted in a matter of minutes by removing or replacing 6 pins and 4 bolts.

The Sherman unit's hydraulic reservoir is oversized for maximum oil cooling. This assures smooth, efficient operation and long life. Its central location and independent suspension within the main frame eliminates possibilities of leaks due to operating stresses. A full-flow, re-usable filter in the reservoir purifies the oil before it reaches the pump.

Sherman Products, Inc.



New Machine Applies Pipe Coating

318 A new machine for applying Tarset, a coal tar-epoxy resin coating, to pipe interiors has been developed.

Applicator, recently demonstrated before a group of about 60 representatives from the pipe, petroleum and gas production and transmission industries, is capable of laying a smooth film of Tarset on the interior of 20-ft lengths of 3, 4 and 6-in. pipe. It achieves a 15 to 20-mil thickness in a single pass.

Two novel features are incorporated in the construction of the applicator. First, the tar-epoxy blend and its catalyst are fed separately into the applicator in carefully controlled proportions. High speed mixer blades thoroughly blend the 2 components. This eliminates the possibility of error as well as the problems of pot-life encountered in mixing large batches.

Second, the mixed material is expelled from the mixing chamber under

positive pressure into a spinning cylinder which centrifugally casts coating on the interior surfaces of the pipe. The Pittsburgh Coke & Chemical Company applicator does away with curtaining or sagging, commonly found when heavy film thicknesses are applied in one coat.

The company is not planning to market the new machine, but is offering the technical assistance of its engineering department in order to facilitate the manufacture of the applicator by interested parties.

Protective Coatings Division, Pittsburgh Coke & Chemical Company

Anchoring for Pipelines

319 Screw type earth anchors, being installed on a major natural gas line project, supply efficient and fast anchoring for pipelines. While they have been publicized to the oil and gas industry only a short time, they have been used on pipelines as far back as 15 years ago.

Fast installation, minimum of material weight, only light equipment required for installation, adaptability to counteract crawling up due to other anticipated forces at critical points as well as anchoring against buoyancy are features of the device. Installation is made right in the normal pipeline trench without the necessity of extra excavation. The anchors are generally

installed with an impact tool operated from an air compressor.

Prefabricated saddle brackets in widths of 4, 8, 12, or 16 in. are supplied for all line pipe diameters. Allowance is made for ⅜-in. padding over normal dope and wrap in fabrication of brackets.

Manufacturer is prepared to recommend anchor size and spacing based on pipe size and specification, anticipated pressures and temperatures, construction classification, and special right of way conditions.

A. B. Chance Company

New Services Initiated

320 Hood Construction Company has had more than 33 years experience as engineering contractors throughout the 11 western states and elsewhere; and are constantly trying to improve and add to the services they offer their clients. This past year they have been able to offer 2 new services — pipe cleaning and internal pipe coating.

Hood's "Flexible" cleaning methods give new pipe efficiency at a fraction of new pipe cost. Even with deposits as hard as concrete, methods can rapidly restore this pipe up to 95 percent of its original efficiency. Fully trained and equipped crews can handle clogged lines from 2 in. to 12 ft in diameter and can clear from 1200 to 6000 ft per working shift.

A second service now available is the "Pipe Life Process" of internal protective pipe coatings applied in place.

Process reduces internal corrosion, prevents rebuild up of deposits, and flow-through is increased. By-pass facilities are provided where continuous service is essential.

Hood Construction Company

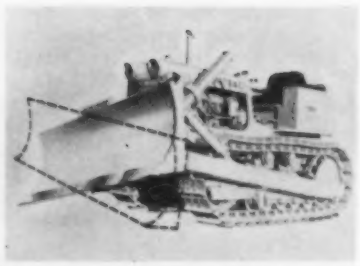
Tractor Has Increased Power

321 Two new crawler tractors, said to offer unprecedented power, speed and maneuverability due to torque-converter drive and an exclusive counter-rotating automatic transmission, are the newest additions to the J. I. Case Company's line of industrial wheel and crawler tractors.

New Model 800 TerraTrac with choice of 80 hp gasoline or diesel engine is said to develop up to 20,000 lb drawbar pull or push with adequate traction. Larger Model 1000, with 100 hp diesel engine, develops up to 24,000 lb pull or push.

The following advantages are claimed for the new hydraulically-operated Terramatic transmission developed by the Case Company: (1) Non-stop power-shifting, with both speed and direction changes made "on-the-go" without clutching, shifting or gear clashing. (2) Effortless power-steering, with independent control of each track. One track can be driven forward and the other in reverse, to make fast counter-rotating spinturns within the length of the machine. (3) Four forward speed ranges from 0 to 6 mph, and 4 reverse speed ranges from 0 to 7 mph.

Among other exclusive new features offered as standard equipment on these crawlers are torsion-bar suspension system and a centralized track lubrication system that cuts greasing intervals



from once a day to several times a year. Case-built equipment for the new, larger TerraTracs includes 1¼ and 2 cu yd tractor-shovels, a new Tilt-Crown bulldozer blade that can be tilted 14 in. to either side hydraulically for crowning, ditching, grubbing out trees, etc., and an exclusive angling dozer blade that can be angled hydraulically while the tractor is in motion.

J. I. Case Company

Rock Breaking Machine

322 Cheap rock materials to meet pipeline specifications are being produced from native oversize rock by the Bros Preparator.

Windrowed rock up to 24-in. in diameter is reduced in-place by the preparator which is towed by any 50 hp tractor. Up to 400 cu yd per hr can be reduced to acceptable pipeline aggregate requirements.

The machine employs 22 free-swing-

ing hammers mounted on a common shaft. Rotating at high speeds, these 47-lb hammers break rock along natural cleavage lines.

Unit has a variable speed transmission which accommodates rocks of varying hardness qualities.

Hammer assembly shaft is driven by silent drive chain which is enclosed in oil and dust tight case with pressure lubrication points to minimize maintenance.

Hammer shaft can be adjusted vertically from −5 to +6 in. to allow maximum wear on the hammers.

Bros Incorporated, Road Machinery Division

Pipeline Excavator-Crane

323 Several models of the new Insley excavator-crane called the "Pipeliner" are currently working on pipeline jobs in the U. S. and Canada. Designed specifically for the pipeline contractor, it features a wide deep carbody with removable bottom cover plates, sealed crawler rollers and tumblers, heat-treated crawler shoes and pins, wide boom foot bearing area and optional 2-speed transmission. A crawler length of 12 ft 6 in. with 24 or 30-in. shoes provides excellent stability and flotation for the rugged work frequently encountered during pipeline construction.

In addition to the special pipeline features, the Insley "Pipeliner" is convertible to all front end attachments and is available with a gasoline or diesel engine.

Insley Manufacturing Corporation

New Crane-Excavator Shown

324 A crane-excavator in 1-yd class introduced by Bucyrus-Erie Company, model 30-B, is shovel, dragline, clamshell, crane, or dragshovel. It is offered with 5 sizes of crawler mountings or as a carrier-mounted transit crane, rated at 35 tons.

Main operating functions of the machine are air controlled. According to the manufacturer, proper graduation of air pressure gives the operator full-feel over his control levers. Air controlled functions include hoist clutch, crowd and retract or drag clutches, swing and propel clutches, steering jaw clutches, digging brakes, swing brake and dipper trip.

Crawler machine is available with either direct drive or torque converter diesel drive, gasoline engine with direct drive, or elctric motor. Transit crane is offered with gasoline engine with direct drive as standard equipment. As a crane, crawler handles booms up to 100 ft long plus 10, 20 or 30-ft jibs. Transit crane handles booms up to 130 ft long or a 110-ft boom with a 30-ft jib. Booms furnished with the crane are of open throat construction. The 30-B boom hoist is independent of all other functions; boom angle can be changed while the machine is swinging or propelling, while the load is being hoisted or lowered.

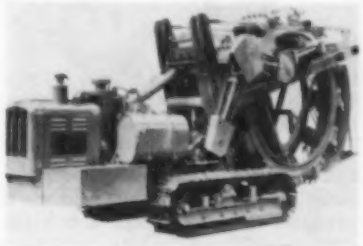
The 30-B shovel features a new design dipper with Becoloy single or two part teeth; a single unit, inside rectangular type dipper handle; large diameter boom point sheaves, and positive, independent twin rope crowd assuring both full engine power for crowding and rapid retract for fast cycles. Dragshovel has a cambered boom with handle attaching to rear of dipper and a telescopic strut on the auxiliary A-frame to prevent "kicking back" when working on steep grades —especially important to pipeliners.

Bucyrus-Erie Company

Wheel-Type Trencher Unveiled

325 A big capacity trenchliner, the Parsons 170, has been added to line of wheel-type trenching machines by The Parsons Co., a division of Koehring Co.

A new feature on the 170 is a hydraulically driven conveyor that provides belt speeds up to 600 ft per min, yet works completely independent of the wheel speeds. As a result, it is possible to place spoil at a convenient distance from the trench wall when wheel speeds are slowed due to tough digging conditions. Unit will produce from 12 in. to 25 ft of trench per minute in a range of 30 digging speeds, according to Parsons' engineers. Maximum digging depth is 5 ft 9 in. A selection of 7 cutting widths are available, extending from 20 to 32 in., in 2-in. increments.



Digging wheel is hydraulically raised and lowered on a vertical mast to hold close grade tolerances at desired digging depths. A separate mast tilt ram holds the mast vertical and tilts it forward for proper balance and clearance when traveling or loading.

Power for the 170 is furnished either by a standard 60 hp gasoline or 54 hp diesel engine. Tractor type crawlers with replaceable links, pins and bushings can be either standard 16-in. grouser type or 12-in. flat shoe type.

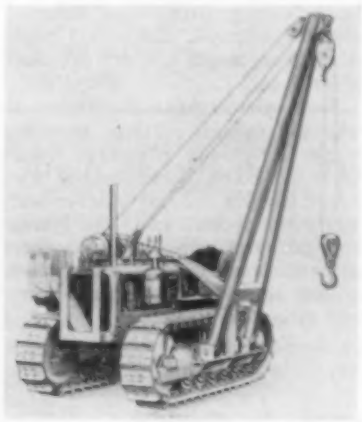
The Parsons Company

Pipe Layer For Small Lines

326 Now available is a new Caterpillar D4 Tractor arrangement, incorporating a newly-announced No. 4 hydraulic pipelayer, designed for use on smaller diameter pipelines by contractors and service companies. Pipelayer is manufactured by Midwestern Manufacturing Company.

No. 4 hydraulic pipelayer has a rated lifting capacity of 17,500 lb at 4-ft overhang, and has a boom length of 13 ft. When attached it provides a tractor clearance of 13½ in. Hydraulically operated counterweights are furnished as standard equipment.

Simplified operation, precise positioning and maneuvering of heavy loads is made possible by a closed hydraulic system controlling the sideboom. Throttling type hydraulic valves assure positive and rapid response of the sideboom, even under capacity loads. The unit can also do an efficient job of backfilling when it is equipped with an angle filler.



Pipelayer is also useful as a utility machine, with many applications on pipeline maintenance jobs.

Caterpillar Tractor Company

Lightest Rotary Air Compressor

327 Lightest 600 cu ft per min rotary air compressor manufactured to date, the Le Roi 600RD2 is the first of a new line of air compressors. It is a portable, 2-stage, sliding vane type rotary air compressor and rated at a

free air capacity of 600 cu ft per min. Dry weight is 7730 lb.

Compressor is coupled to a GM-71 diesel engine with a hydraulically activated clutch. By use of an automatic variable capacity regulator and an automatic governor speed control, engine speed varies to match air demands.

Engine-compressor is supported on a unit welded steel frame and is enclosed in a heavy metal housing of streamlined design. Three-point suspension of engine-compressor, including rubber cushion at engine trunion, protects against damage from towing distortion over rough terrain. The overall height is 7 ft 6 in.; length is 12 ft 6 in.; width is 6 ft 8 in.

Each cylinder has a double-row intake and exhaust portings, providing higher compressor efficiency. Rotors are supported on double-row ball bearings at the gear end and on roller bearings at the opposite end. This bearing arrangement stabilizes linear movement of the shaft and still allows for growth of shaft and cylinders during temperature variations.

Le Roi Division, Westinghouse Air Brake Company

Fittings for Pipelines

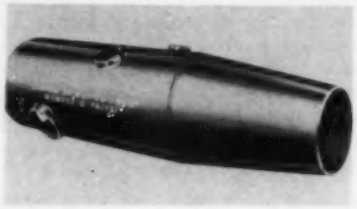
328 Working closely with pipeline engineers, Ladish Company has developed and is producing a special-purpose fitting which simplifies installation and effects 70 percent saving in welding time required to complete by-pass, blow-down and branch connections to pipeline gate settings. This development is a completely integrated factory assembly consisting of a straight run with multiple seamless outlets in exact specified positions . . . plus a conical reducer. Fitting eliminates the practice of nozzling in branch connections and saddle reinforcements.

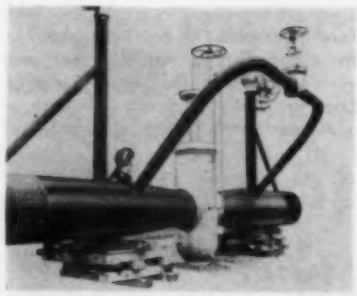
Multiple Outlet Fittings are formed by forging process which directions metal grain flow, improves metal structure, distributes metal for increased strength in crotch zone and reduces flow turbulence by providing smooth transition between fitting and branch.

Installations of this fitting unit have already been made on 24, 30 and 36-in. lines with a wide variety in the number and size of outlets. Multiple Outlet Fittings are available in sizes up through 42-in. pipe — and larger if required. There is little restriction as to the number, size or arrangement of outlets, or the length of either straight run or conical reducer. Ladish has already produced Multiple Outlet Fittings with wall thicknesses up to 1⅜ and heavier wall. Outlet Fittings can be produced to meet virtually any service requirement.

In addition to being used for valve settings on the main line, Multiple Outlet Fittings are also being used as suction and discharge manifolds.

Since Ladish Multiple Outlet Fittings





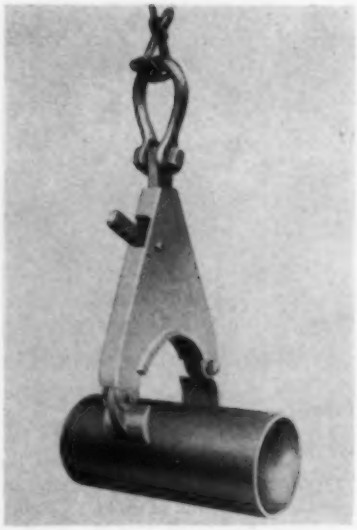
are manufactured to the design requirements of each installation, field work is reduced to making simple butt welds to valves and auxiliary lines.

These Multiple Outlet Fittings, as well as all other Ladish fittings, are produced to rigid metallurgical standards and exacting physical dimensions.

Ladish Company

Automatic Pipe Tongs

329 A completely new device is being introduced for safer, faster and easier pipe handling. New Mathey Pipe Tongs are the only truly automatic release tongs on the market. The pipe is released automatically when weight is slacked off. For safer handling, the Mathey Tongs do not require anyone near the tongs to manually release them. Since they are truly automatic, they provide greater working efficiency with fewer accidents for the crew. They are ideal for manufacturers of steel and cast iron pipe, and for pipe facilities where many miles of pipe are handled. The 8-in. Mathey Tong was proven and thoroughly field tested recently on 800 miles of takeup, equivalent to 100,000 lifts and releases. Mathey Automatic Release Tongs are rugged in construction to withstand the hard service required by pipe liners. They are available in a complete range of standard pipe sizes from 4 to 36 in.



C. A. Mathey Machine Works, Inc.

Switch For Vacuum

330 Model 2273 has a metal diaphragm to give extremely accurate response. It comes in 2 classes for sensing pressure differences from 15 in. of water below atmospheric pressure to 80 in. of water above. Fixed actuation value ranges from .2 in. of water to 2 in. of water depending on switch setting. The reference pressure must be air or an inert gas; the variable pressure may be liquid or gas. The switch will actuate an electric circuit on an increase or decrease of a predetermined pressure difference. Switch is not sensitive to jarring or vibration and it will operate in any position — no leveling or special mounting is necessary.

Recommended to operate relays, solenoids, motor controls and similar devices, a splash-proof housing protects the entire mechanism from dust or damage in exposed installations.

Barksdale Valves, Inc., Pressure Switch Division

Color Covers Blackest Surfaces

331 New color coat, No. 261, will stick to and cover black bituminous coatings, old or new, as well as concrete, brick, cinder block, porous roofing tile, asbestos shingles, stucco—and properly primed wood and metal. Dry time is approximately 30 minutes.

A modified acrylic resin dispersion combined with selected chemically inert pigments, Insul-Mastic Color Coat No. 261 leaves a tough pigmented plastic film that flexes with expansion and construction of base material. It is especially suitable for color keying service lines.

Coat takes weather in stride, and also shows remarkable resistance to sunlight, gases, corrosive fumes, cleaning compounds and many solvents.

It is available in rose, light green, light blue, light yellow, light buff, light gray, dark gray and white. Safe to store and apply. Application is economical by conventional spray equipment, brush or roller.

Insul-Mastic Corporation of America

Three New Valves for Pipeline

332 Three new lines of Crane 600 class steel gate valves for oil and gas service have been announced. They include: (1) A single-disc, conduit type pipeline valve, (2) a double-disc, parallel seat pipeline valve, and (3) a smaller gate valve for general services. Both new pipeline valve designs are suitable for service with crude oil, refined petroleum products, and gas, at atmospheric temperatures.

Steel conduit valves will be furnished in sizes from 2 through 30 in. Design features include one piece disc, with parallel faces, that requires no excessive stem thrust to effect tight seating, since line pressure does the work. Body rings are self-aligning and sealed with "O" ring gaskets. These can be slipped in and out by hand, saving time in field maintenance. Spring-loaded wiper plates push against the body rings, holding them in constant seat contact with the disc for immediate sealing, and preventing line dirt and foreign matter from entering the body chamber. Design permits flow in either direction.

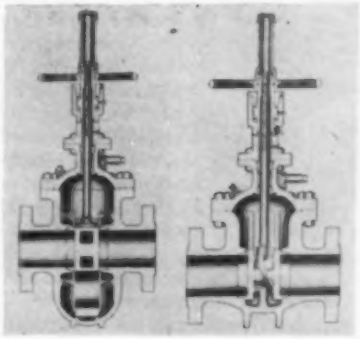
Straight-thru, conduit design also permits easy passage of a scraper, and creates no turbulence.

New conduit valves are available with flanged ends, butt welding ends, venturi flanged ends or venturi butt welding ends.

New Crane double-disc parallel seat pipeline valve will be furnished in sizes from 2 through 24 in. It is designed so that discs are free to rotate, changing their seating position at each closing, thus distributing wear more uniformly and prolonging the service life of the valve.

Accurately-machined annular wedging surfaces keep the discs aligned with the parallel seat faces of the body rings. Each disc has a rim around its outer edge, and this rim rides in accurately-machined guides, taking the wear usually imposed on disc faces in double disc valves of conventional design. A smooth, straight passageway through the valve minimizes turbulence and assures smooth flow of line material.

Both conduit and double disc pipeline valves feature a plastic packing injector protected by 2 ball-check valves. Both designs may be back seated, permitting replacement of high pressure "V" rings while in service, and allowing proper body and disc port alignment when open. Both new Crane pipeline gate valves also feature completely enclosed and grease-packed yokes, for protection and lubrication of stem threads. Both are equipped with stem protectors to guard against dirt and effects of the weather.



Small 600 class gate valve is available in sizes from ¼ to 2 in. These compact cast steel, inside screw valves with union bonnets, are suitable for service with oil and oil vapors at temperatures up to 800 F.

Crane Company

Giant Relief Valve Insures Safety

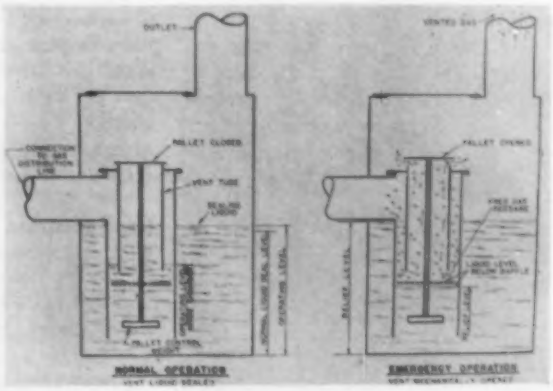
333 Graver Tank & Mfg. Co., Inc. offers a new use for its Graver Liquimech Valve. It is a liquid sealed, mechanically operated valve functioning in this particular instance as a safety device protecting the low pressure gas lines against a build-up of overpressure. Two important advantages are readily apparent in the utilization of this valve. First there is no leakage and secondly only a minimum amount of maintenance is necessary.

Valve's structure is simple. It consists of 2 concentric chambers inserted into a third chamber which is partially filled with a light oil. Outer inserted chamber connects to the gas line to be protected and the inner chamber or vent tube contains a baffle and weighted pallet for relieving gas at a predetermined pressure.

It can be designed for emergency relief of pressures or vacuums up to approximately 1 lb per sq in. and can be made in either single or combination units, depending on the circumstances.

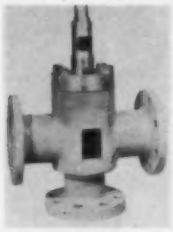
Its original purpose was to provide leak-proof protection for the Graver Expansion Roof closed vapor systems.

Graver Tank & Mfg. Co., Inc.



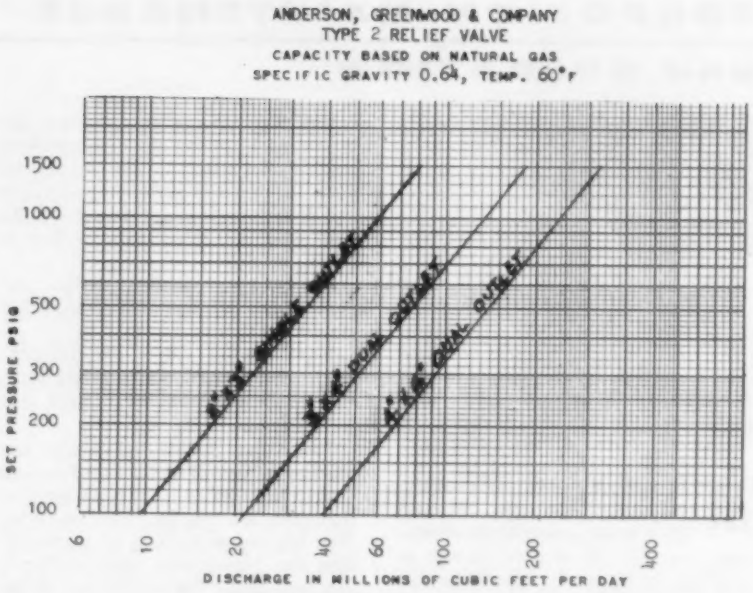
Valve Has High Capacity

334 AGCO Type 2 Pilot Operated Relief Valve is being placed on the market. This valve is specifically designed for natural gas compressor discharge lines, metering stations and general natural gas pipeline use, but operates equally well on any gas or vapor service where maximum operating pressures do not exceed 1500 psig. Full capacity is obtained with zero overpressure or accumulation.



Basic operating part of the Type 2 valve is a free floating piston of differential area design. Pressure on the upper or larger surface of the piston is reduced by venturi action when the small spring loaded pilot opens, thus allowing the piston to rise and the valve to relieve. Teflon discs of an exclusive design are used in both the pilot and main valve to assure long dependable life. Simplicity of the design makes it possible for one man with standard tools to completely maintain the valve in the field.

Orifice diameter of each size valve equals the nominal pipe diameter. Resultant high capacity allows the user to install a much smaller valve than is possible with conventional spring loaded relief valves. Line restrictions caused by block valves or other equipment placed adjacent to the inlet have not caused chattering or malfunctioning in any way.



Pilot valve assemblies are interchangeable in all valve sizes. Normally, the inexpensive Teflon seats are the only parts which need to be carried in inventory. Valves can currently be furnished in 2-in. inlet with a single 3-in. outlet, 3-in. inlet with dual 4-in. outlets and 4-in. inlets with dual 6-in. outlets.

A manual blow-down valve can be provided on all styles for check popping or for blowing down the line.

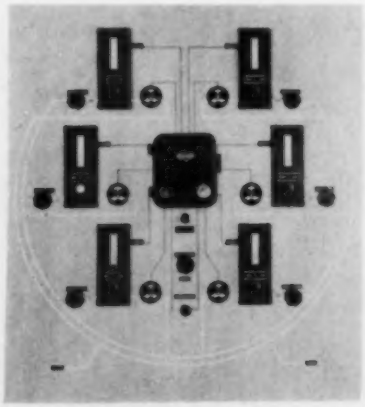
Anderson, Greenwood & Company

Automatic Filling-Draining System

335 A new Automatic Tank Selector System has been developed by Mason-Neilan for controlling the filling of storage and settling tanks.

The ATS System uses a pneumatic circuit, with selector - controller and level transmitters directing operation of pneumatic fill valves. System is said to be extremely accurate, reliable and economical.

In operation, system automatically senses the liquid level of each tank and then automatically opens the fill valve if tank requires filling, or automatically cycles to next tank if filling is not required. This scanning operation can be continuous or intermittently cycled as needed, requiring only one second per tank. Each ATS Circuit can handle up to 12 tanks and 2 or more selectors can be connected in series to control any number of tanks.



Low cost is one of the most attractive advantages of the new Mason-Neilan Automatic Tank Selector. System requires a minimum of equipment—only 1 control valve, and 1 level transmitter for each tank, plus the 1 selector-controller unit for every 12 tanks. Low initial cost plus automatic controls offer many new savings opportunities in refineries, tank farms and chemical plants.

Mason-Neilan, division of Worthington Corporation

Line Location

336 Electronic locators are used for determining the true position and depth of sub surface installations, mains, laterals, stubs, valves, cables, etc.

The Wilkinson Line Locator is designed to effect positive locating under difficult conditions.

All circuitry is etched, or printed, instead of hand wired. This means freedom from faulty soldering. Its functioning is more uniform and servicing is simplified.

A built-in battery tester enables the operator to determine battery condition instantly, wherever he may be on a job. Batteries are automatically switched off when not in use. This prevents undue depletion, prolongs battery life. Antennas are built into case frames, firmly cemented to protect them from moisture and shock. Instrument cases are constructed with a tough, wear resisting, phenolic material.

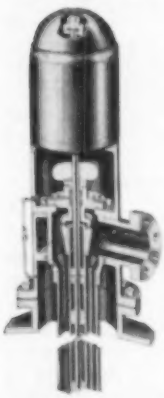
A built-in measuring gage indicates the depth of lines. This locator is equally effective when used inductively (simply carrying the unit over buried lines) or applied conductively, i.e., tracing a particular line by direct physical contact, pipes that may be closely paralleled by a conflicting line.

A substantial felt and foam rubber lined carrying case, with separate compartment for accessories, is available.

Wilkinson Products Company

Head Simplifies Pump Removal

337 A new type of "split-to-pull" head makes possible removal of pump from its position in tank, sump or pump case (barrel) without disturbing the piping or sump cover. By removing cap screws, pump is disconnected for removal.



Leakless packing for stuffing box assemblies is provided by a unique type of stuffing box construction that prevents the build-up of pressure. Pressure relief is accomplished by a drain port in the box opposite the lantern ring for relieving pressure and draining fluid back into the tank or sump. There are 2 small recirculating orifices at 180 deg in the lower part of the stuffing box to permit the flow of liquid down the shaft enclosing tube through the lineshaft bearings and out of the bypass ports in the top bowl. This type of pressure relief, through the lantern ring and recirculating orifices, provides pressure control below first stage of packing to approximately 10 percent of the total head.

Layne & Bowler Pump Company

Pipeline Marker Also Junction Box

338 The L & M Company, manufacturers of aluminum marker-vents, signs and aerial markers, have recently expanded their line of products to include several types of junction boxes for cathodic protection test leads.

Models shown in the picture include the combination marker-vent and junction box for installing on highway and railroad casing vent pipes. A hole is drilled and tapped in the bottom of the junction box for either ¾ or 1-in. conduit to protect test lead wires coming up into the box.

For test stations not located at cased road crossings, other junction box models are made to mount on pipe posts. The back of the box is open into the cap so that test lead wires may be brought up inside the pipe post. If use of a ¾ or 1-in. conduit is desired with these models, the bottom of the junction box is drilled and tapped to receive it.

A 6 by 6-in. information panel designed to customer specifications is cast on model 303-66 CJP as shown.

Model 303 CJ is made without the information panel, but company name, test lead station number and mile post number can be furnished cast in the junction box cover plate.

Micarta plates with up to 6 terminal posts are secured inside the junction box and can be removed to install wires. An aluminum cover plate with sheet rubber gasket keeps the box water tight.

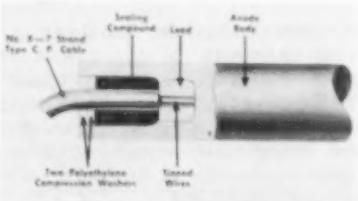
All models are available in sizes to fit standard 2, 3 or 4-in. pipe, or other OD pipe as specified.

Distributed by—
Tod Pazdral Pipeline Specialties

Anode Connections Cold-Welded

339 The Duriron Company introduces a new design feature in the electrical connection of their impressed current anodes.

Because Duriron cannot be machined readily, connections involve special considerations. The anode is cast with an irregularly shaped cored hole. Bare wire of the cable is tinned,



Standard Durco Anode Sizes.

Type Anode	Size	Area Sq Ft	Weight (Lb)	General Application
B	1″ x 60″	1.4	14	Fresh Water
C*	1½″ x 60″	2.0	25	Ground Bed
D	2″ x 60″	2.6	46	Ground Bed
E	3″ x 60″	4.0	115	Salt Water
F	1½″ x 12″	0.4	5	Fresh Water
G	2″ x 9″	0.4	5	Ducts
J	3″ x 36″	2.5	80	Salt Water

*Applicable also in fresh water service. Should not be used in ground beds without backfill.

and forms a cold weld with the lead poured into the head of the cored hole. Remainder of hole is filled with a sealing compound and is closed off with 2 polyethylene compression washers. This connection is designed to exceed the pull strength of No. 8—7 strand type CP cable. Durco anodes can also be joined end-to-end. An internally threaded steel insert is leaded into the irregularly shaped cored hole. Anodes are then joined together by means of a bronze stud and Neoprene washer.

An adequate stock of the standard sizes listed in the table below are maintained for immediate shipment.

The Duriron Company

Self-Propelled Pipe Cleaning Machine

340 Designed for maintenance and repair work on loaded oil, gas and products lines, this lightweight, vibrationless self-propelled, revolving head pipe cleaning machine cleans more pipe per day than any other method. Manufactured by Remco, it is quickly and easily mounted to the line by two men and it requires only 6 in. of clearance under the line. It has an adjustable forward speed of from zero to 60 ft per min and is completely self propelled.

Ideal where weight and vibration are a hazard and where service cannot be interrupted it uses standard knives, cutters or brushes or any combination of these and leaves the pipe clean enough for the application of hot primers, dope or tapes.

Of particular advantage is the fact that forward travel and rotation of the cleaning head are completely independent. This enables the operator to have complete control over the cleaning operation.

Machine is mounted with two operations. First the cleaning head is attached to the pipe and is easily centered by calibration marks on the head ring. It is securely fastened to the pipe by a positive locking device. Then the separate power unit is mounted to the cleaning head.

The Cleaning Machine comes in 10 different models, each model capable of cleaning three successive sizes of pipe from 2 to 36 in.

Remco Manufacturing Company

Large Motor for Outdoor Service

341 Successfully meeting the requirements for non-hazardous outdoor service, Allis-Chalmers weather-protected motor (Type FOD) is available in ratings of 250 hp and larger.

New motor is built into a rigidly constructed fabricated steel frame equipped with 2 removable air ducts. Capsule mounted sleeve bearings are supported by cast iron bearing brackets which close the end of the frame. Frame houses a removable pre-wound stator assembly unit. Stator leads, completely enclosed and protected, are brought to a diagonally split cast iron conduit box.

Heavy steel removable air intake ducts have openings at each end. Their design minimizes the effects of high velocity winds and the entrance of entrained moisture and particles into the electrical parts of the machine. Gutters above the air intake openings prevent water from falling into the air intake stream and ducts are equipped with protective screens.

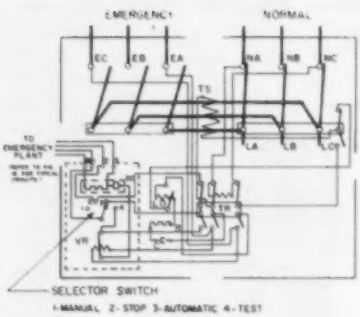
Dry-type washable air filters are optional and can be installed through the filter access hole in the side of the air duct. Air discharge openings in the bottom of the frame are baffled and screened to by-pass high velocity winds under the motor.

Motor has capsule mounted babbitted split sleeve bearings for direct connected service which permits access to the motor interior without disturbing the bearing and its enclosure. Stator windings can be easily inspected and cleaned by removing the upper half of the horizontally split bearing bracket and split air deflector.

Allis-Chalmers Manufacturing Company

Adapter for Standby Engine Control

342 A new gasoline engine remote control unit is being marketed by the Automatic Switch Company. Unit is designed primarily for adapting push button started electric plants for use as stand-by plants.



Some electric plant manufacturers utilize a 2-button system of control for their remote control type plants. When this type of plant is used for stand-by service with a transfer switch, additional controls must be furnished in order that automatic starting and stopping will be controlled from contacts on the transfer switch.

ASCO controls adapt this type of plant to stand-by automatic operation under control of the transfer switch. To provide this automatic operation transfer switch with which it is used is equipped with one contact which opens when the normal source fails, and a second contact which closes when the normal source fails.

Automatic Switch Company

COMMUNICATION INSTRUMENTATION

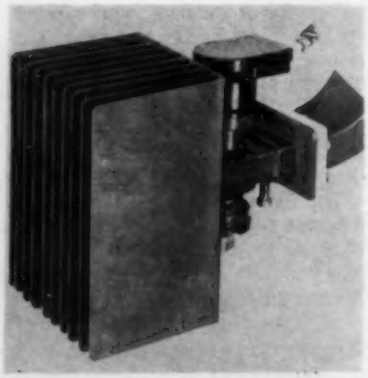
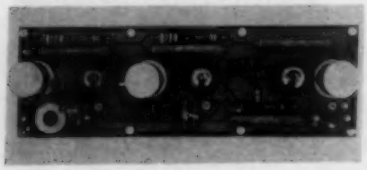


FIG. 1. Heat sinks are incorporated in microwave design to eliminate blowers for cooling of the klystrons.

FIG. 2. Printed circuits here being used to increase dependability and for easier maintenance.



Microwave System Provides 120 Channels

343 Philco Corporation's Government and Industrial Division has developed a highly dependable and more sensitive terminal transmitter-receiver for its microwave communications systems.

Termed the CLR-8 (Communications Link Relay), the terminal is an advancement in design over Philco's other super high frequency units operating in the 6000-7500 frequency range.

Of major importance is the unit's high channel density. The CLR-8 provides 120 voice channels for extreme communications versatility. Designed to increase communications efficiency over long distances, microwave point-to-point transmission of voice, facsimile, teletype, telemetering and automatic remote control information is offered.

Among other features is the efficient utilization of printed wiring boards that are far more dependable and easier to maintain than conventional circuitry. If a circuit does fail, maintenance personnel need only remove the printed wiring board and replace it immediately with another. The damaged circuit may then be corrected at leisure in the maintenance shop instead of keeping a terminal out of operation while performing maintenance. In utilizing them, Philco has also reduced the number of types of tubes required to six. Only six different types of tubes are found in the entire unit.

In addition, still more compactness is achieved through the elimination of bulky and troublesome blowers to cool the klystrons. "Heat sinks" are used which cool the klystrons by convection. This means klystron failures caused by faulty blowers are eliminated as well as extensive blower maintenance.

Selenium and germanium bridge rectifiers replace the tubes thereby eliminating the possibility of tube failure while affording long life potential and cooler operation of the power supplies.

Perfectly compatible with other Philco microwave equipment, it can be utilized for single hop or multi-hop installations with a variety of frequency-division or time-division mul-

tiplex equipment to provide 120 voice channels over a single microwave system. Under certain circumstances, 240 voice channels can be provided.

Pipelines have found Philco microwave particularly beneficial in providing communications facilities for telephone circuits and automatic control operations permitting remote reading of tank levels, pressure and rates of flow, as well as to open and close line valves and to start and stop pumping stations by remote control from a central dispatching station.

Philco Corporation, Government and Industrial Division

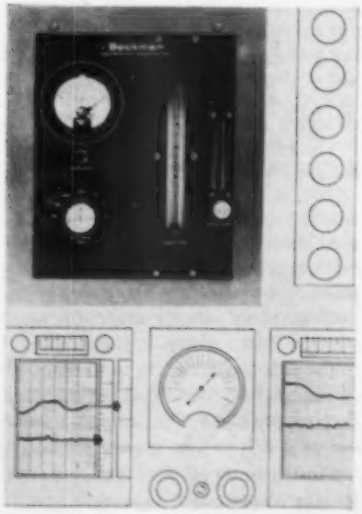
Hygrometer Panel Mounted

344 Process Instruments Division, Beckman Instruments, Inc., offers a new panel mounted electrolytic hygrometer. This unit automatically and continuously measures water concentrations in vapor samples with a 5 percent accuracy in the difficult 0-1000 ppm range in temperatures up to 100 C. The hygrometer is a valuable industrial instrument for controlling corrosion, product purity and process efficiency.

Analysis is performed by continuously passing a sample gas stream through a special analytical element that absorbs and electrolyzes all moisture present in the stream. The current required for this electrolysis is a precise measurement of the amount of water present.

Incorporated in the hygrometer is an alarm system that can be set for any point in the instrument's range. A standard potentiometric recorder or recorder-controller, 10 or 50 mv, can be operated from the hygrometer output, making possible the continuous monitoring of water vapor in stream.

Process Instruments Division, Beckman Instruments, Inc.



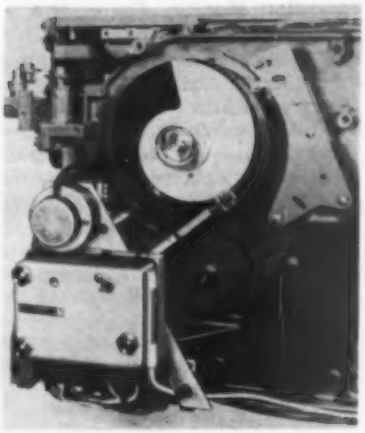
Instrument Provides Continuous Integration

345 Librascope, Inc. announces a new linear integrator that can be used to provide continuous integration in any instrument or system where integration, area of average computations, and direct or remote readings are required.

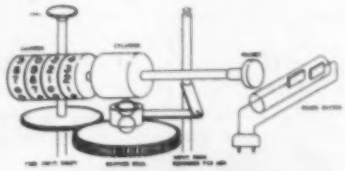
Model 25 Linear Integrator is the latest addition to line of computers specifically designed for the gas and petroleum industry. Among the other devices is the Model 90 Flow Computer, which utilizes a new principle for continuously solving the flow equation of gases.

Model 25 is a ball and disc integrating mechanism, assembled with a counter and an output pulse switch. Extremely compact, it can be adapted to strip chart recorders of all types and sizes, and can be used wherever the variable to be integrated or averaged can be presented as a shaft position or displacement.

A unique feature of this computer is its new method of handling the inputs. Normally the computer is mounted in a suitable position to accept the output of the transducer or recording pen motion as an input. A time motor drives a disc, which in turn imparts rotation to a cylinder through 2 steel balls. The steel balls rotate in a carriage that is positioned by the input shaft through an arm and a connecting link. Thus, if the motor drives the disc at a constant speed, the cylinder will turn at a rate proportional to the degree of rotation of the input shaft. As the measured variable changes, this motion positions the ball-carriage so that the counter-speed will be proportional to the integral of this variable with respect to time or the time-input function. The counter will then read the result of this



Model 25 Linear Integrator attached to a chart recorder. It is adaptable to most popular strip chart recorders.



computation over the period between readings—and—the output pulse can be used to transmit this reading to a remote counter or recorder.

Because of the low torque requirement, this unit can accept the outputs of sensing elements directly, without the need of servos. Pulse output provides for convenient electrical transmission for use in data system or remote counter.

Applications for this new computer include flow totalization, averaging of temperature and pressure valves, and area computation in gas analysis procedures.

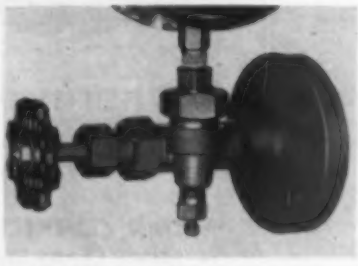
Librascope, Inc.

Unit Combines Union, Valve and Drain

346 A new valve for instrument piping and general use which acts as a block valve, as well as greatly reducing the number of threaded connections required, is introduced by Jerguson Gage & Valve Company.

Valve, the Jerguson No. 66U-VG, is an offset valve with a vertical rising ball check on the downstream side of the seat and a solid shank connection to the vessel which makes it acceptable as a block or root valve, and makes it possible to eliminate the usual block valve.

These valves combine unions, nipples, reducers, elbows, tees, valve and drain valve into one space saving unit, thus greatly reducing the number of



threaded connections. They have a double seating stem for repacking under pressure and a pressure bleeder valve and test gage connection. Seats are regrindable and renewable; and the valves have union connection to the gage. Many optional features and other connections are available.

Jerguson Gage & Valve Company

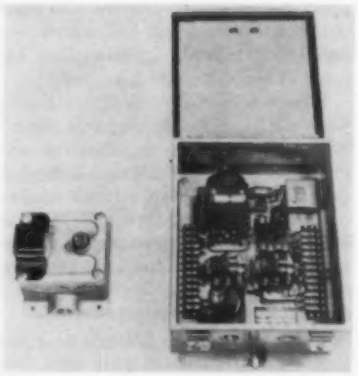
Vibration Monitor Protects Rotating Equipment

347 New non-electric vibration monitor system that is sensitive to increases in vibration yet ignores both starting vibration and transient shocks normal to operation has been developed by Robertshaw-Fulton Controls Company. System combines the Robertshaw Model 65 malfunction detector, for mounting on the protected equipment, and a new Model 651 a-c control unit which is wired to the detector.

Malfunction detector is designed for use in Class I, Group D; and Class II, Groups F and G locations. Control unit is oil-tight and is installed in a non-hazardous location unless connected with an air line using an optional air purge fitting.

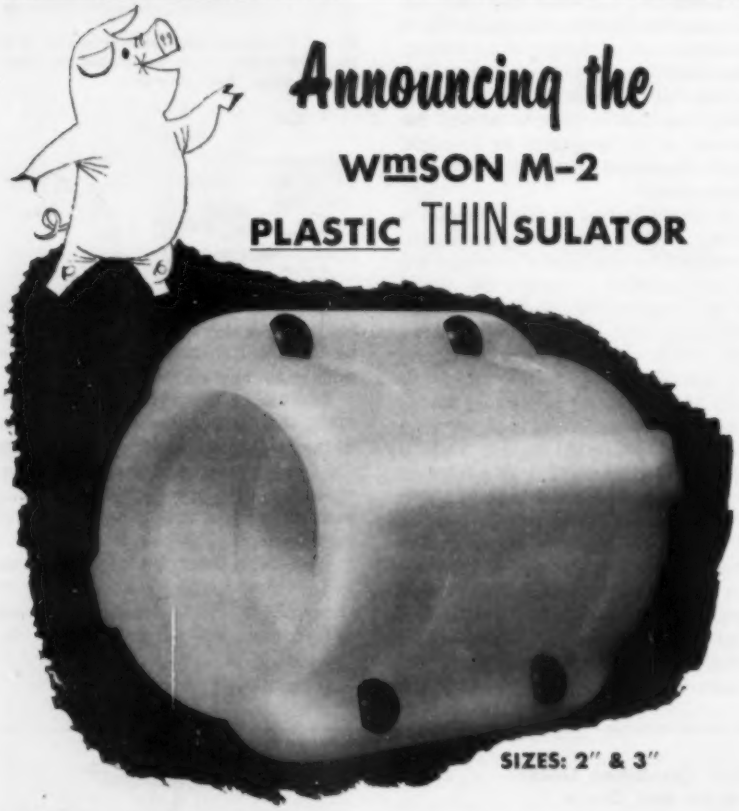
Applications include the protection of pumps, motors, blowers, compressors, centrifuges, engines, turbines and other costly equipment.

In operation the detector trips whenever the vibration exceeds the preset vibration level. The Model 651 control unit must reset the detector in rapid sequence several times before the shutdown time delay relay will actuate. The unit is held inoperative for a selected time of up to 120 seconds after starting to allow the protected equipment to reach full speed.



System uses no vacuum tubes.

Fielden Instrument Division, Robertshaw-Fulton Controls Company



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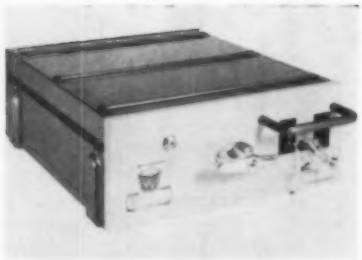
Telemeter Added to Flow Gage

348 Two Brooks transmitters are designed for use with Full-View Rota-meters for general industrial applications. They provide remote flow indication, recording, controlling and/or integration with secondary instruments of any manufacture. Transmitters consist of the interchangeable Mag/Nu/Matic pneumatic and Elec/Tru/Matic electric transmitter.

The Mag/Nu/Matic transmitter is rugged and has characteristically fast response. It is equipped with a precision indicating gage graduated in pounds per square inch output pressure (3-15) and percent of scale. Each transmitter is furnished with a dead-weight calibrator to permit high accuracy without reference to the receiving instrument. Utilized design allows the relay assembly to be removed for cleaning or replacement without disturbing the transmitter calibration. Both armature and force-balance units are removable as complete assemblies. Air supply and air output connections are at the base of the transmitter, but located so as not to interfere with purge or steam connections.

The Elec/Tru/Matic transmitter can be used with practically any type of electrical receiving instrument: Millivoltmeter, potentiometer, or resistance type. It is equally applicable to automatic logging and data reduction equipment. It is inherently linear and is explosion proof in its standard form without extra charge. The electrical transmitting element is a strain gage arranged as a Wheatstone bridge. Since both supply and output voltages may be a-c or d-c, it can be used with receiving instruments of all makes.

Brooks Rotameter Company



Radio Cuts 'Channel Chatter'

349 Motorola "Private-Line" radiophone is designed specifically to maximize the efficiency of 2-way radio communications under congested channel conditions. Freedom from annoying "channel chatter" is said to eliminate operator fatigue and missed and misunderstood messages — even in the presence of co-channel occupants and on-channel nuisance and skip interference. Nuisance noise and undesired transmissions from other systems cannot unlock the speaker. Even the normal carrier-off FM hiss of "squelch tail" is eliminated from Motorola Private-Line mobile receivers.

In the Motorola Private-Line radio system, talk-out and talk-back protection can be provided for separate or simultaneous operation. In such a system, the mobile operators and the associated dispatcher hear only those calls transmitted within their own operation.

Motorola Private-Line radio, unlike the conventional tone-pulse selective calling system, employs a continuous, inaudible subcarrier tone on the transmitted carrier. The coded signal received operates an exclusive tone-coded receiver squelch circuit. Squelch sensitivity is automatically and electronically maintained at optimum, assuring maximum communications range at all times. Elimination of the traditional manual squelch control prevents desensitization of the receiver by careless or intentional misadjustment. Interfering signals cannot "trip" or "lock in" the squelch circuit, since continuous presence of the properly coded carrier is required to keep the speaker "open."

There are no additional buttons, lights, adjustments or operational techniques involved. Elimination of squelch adjustments makes Motorola Private-Line radio even simpler to operate than conventional equipment. A wide choice of mobile and base station models is available in the 25-54, 144-174 and the newly-announced, 450-470 megacycle frequency bands.

Motorola Communications and Electronics, Inc.

Test Box for Cathodic Protection

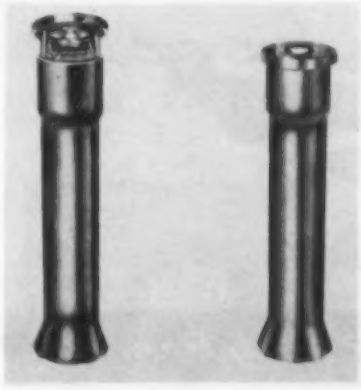
350 A revolutionary Test Station Box especially designed for cathodic protection introduced four months ago now looms as an important product contribution in the field of pipeline corrosion control.

Testing is far more simple on cathodic protection systems equipped with the new box, because leads are securely fastened to a terminal block in the cap and the entire assembly is easily lifted and tilted for testing.

Made of non-corrosive Kralastic, the new box can be installed flush to the ground for its magnetic top with aluminum plate registers strongly on either magnetic or electronic finders thereby making it easy to find. This inconspicuous method of installation prevents accidental damage to the terminal box, doesn't detract from the harmony of the landscape and means that there is less chance for outsiders to tamper with test leads.

Use of a terminal block in the cap assembly minimizes wire movement when testing and greatly reduces the chances of wire breakage.

Two models TR and TR-5 are in production at this time. The only difference between the two is in the construction of the terminal block. Model TR has 2 terminals while Model TR-5 has 5 terminals. Both are 15 in. in length and weigh approximately 17 ounces.



Standard color of the boxes, including cap, is black; however, provisions have been made to supply colored caps with company initials.

Handley Brown Heater Company

Time Code Control System

351 A new coding unit with circuitry especially designed for centralized control systems, such as pipeline transport control, has been developed.

Basically the new unit is a 24-step Time Code system which can be shortened by external jumper connections, or can be lengthened beyond 24 steps by addition of extension counting chains. The unit can also be arranged to use different length codes for different operations.

Station selection combinations available in the new unit permit applications for any one of a dozen or more combinations from single station up to 126 stations. Code steps not required for station selection can be utilized for function selection if needed. This makes it possible to custom design this system more closely to the specific requirements of the installation involved.

This new unit has been designed to be adapted to any one of a number of different communication circuit facilities with a minimum of circuit co-ordinating equipment.

This type of code unit can be used not only for all the above combinations but it can also be connected so that it can serve at either the central control location or at remotely operated stations. This interchangeable feature is easily accomplished by simple external connections.

Due to wide range of applications only the one type of code unit is required for maintenance purposes.

Union Switch & Signal, Division of Westinghouse Air Brake Company

Clutch Size Problem Solved

352 The growing need for more and more power and longer and longer work hours presented design engineers with the problem of devising clutches that help meet these requirements. A new clutch arrangement, using friction material with a ceramic base, for use in heavy-duty and off-highway type machines was the result.

Increased capacity, better heat disposal, better ventilation, cooler running, no fading, longer wear, fewer adjustments and more usable lining material are some of the improvements accomplished by this new type clutch. Users of tractors, trucks, dozers, road building machines, oilfield rigs, etc., report that these new clutch plates provide more than double the torque capacity, 4 to 10 times the work life.

Rockford Clutch Division supplies the new Morlife clutch in both overcenter and spring-loaded types in a wide range of sizes up to 18-in., single and double plate, designed and engineered for specific applications.

Rockford Clutch Division, Borg-Warner Corporation

Largest Known Displacement Meter

353 World's largest known positive displacement liquid meter, recently manufactured at the Pacific Coast Works of the A. O. Smith Corporation, is designed to accommodate a 16-in. petroleum line. It has a rated capacity of 10,000 bbl per hr, measuring a full barrel of product at each turn of its rotor.

The unit, Model B-700, is designed to answer oil company requests for meters of sufficient capacity for tanker loading service, and for use directly on large product lines. Conventional tanker loading practice employs tank strapping methods, wherein storage tanks are filled with a product, the tanks are gaged, and the product pumped aboard ship. It is expected that the B-700 will save much of the time now consumed by this practice. A product now can be metered directly to the tanker, saving many hours of turnaround time.

The meter is classed as a rotary, positive displacement liquid type and may be broken down into 2 chief components. An outer case serves as a housing for the inner case or metering mechanism. The outer housing withstands

pressures of liquids passing through the meter, maintaining an equalized pressure on all portions of the inner mechanism. The inner mechanism measures liquid volume as it passes through the meter.

The outer case is rolled and fabricated from sheet steel and is heat treated to permit operation at working pressures up to 150 psi, with a safety factor of 4.

Meter output is transmitted through shafts and liquid seals to a counter mounted atop the meter. Here the liquid volume in barrels can be read and recorded.

The meter is 65 in. high, exclusive of the counter; shipping weight is 6490 lb; total distance between its 2 flange faces is 46 in.; outside diameter of the outer case is 36 in. Thermostatic system automatically adjusts the meter reading to a true volume at 60 F.
A. O. Smith Corporation

Material Permanently Patches

354 A new patching and skid-proofing material which will weld permanently to concrete and other masonry has been added to the product lines distributed by Mavor-Kelly.

This epoxy-based polyplastic alloy, trade-named Permagile, is found to solve many of the most aggravating problems faced by plant maintenance, safety, and public-safety engineers.

Mavor-Kelly has for many years specialized in industrial corrosion prevention materials in connection with the petroleum and pipelining industries. Decision to add Permagile was made because of the valuable services this unique repair and maintenance product can render to plant executives in the petroleum and pipelining fields.

Permagile, according to Mavor-Kelly, literally welds to any masonry surface, making a weld-bond far stronger than the concrete itself. Patch is tremendously resistant to wear and impact. It is completely and permanently

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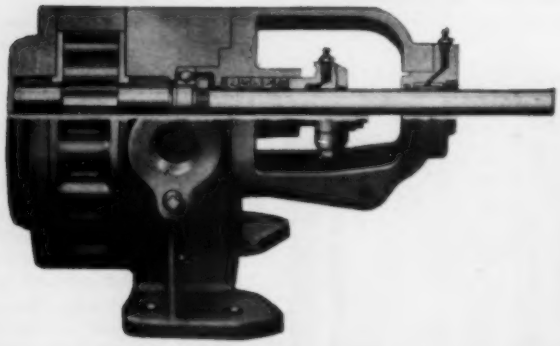

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waterproof and unaffected by age, weather, or temperature change. It is impervious to grease, oil, detergents, alkalies, mild acids, and general chemicals. It neither shrinks nor expands, either during hardening or later. Also, unlike most repair materials, Permagile can be featheredged.

Permagile is supplied in a variety of forms for specific uses. The type used in the average plant for floor, stair, and roadway repair and skidproofing is Permagile "S." This consists of two components, a polyplastic base and a liquid reactor. These come in a single two-component package. When the components are mixed, the result is a self-leveling syrupy material which is very easy to apply. In the process of curing into a rigid, inert condition, the exothermic heat generated promptly welds the patch to the surface to which it is applied.

Permagile mortar has an additional number of plant uses. This is made by the addition of dry silica sand, quartz sand, flint shot or stone aggregate with Permagile in ratios supplied with the instructions. Such mortars are particularly economical for filling large cracks or depressions.

For prompt skidproofing, carborundum grit or powder may be mixed into Permagile mortar to form a prompt skidproof surface.
Mavor-Kelly Company

Holiday Detection

355 A new electrode for holiday detectors made of conductive silicon, which will not "wet" in hot coating material, and which holds its shape and conductivity in temperatures from —20 F to +450 F, has been developed by Tinker & Rasor. Used for inspecting flat coated surfaces by high voltage electrical energy, this conductive silicon electrode replaces wire brush electrodes used for the past 25 years. The silicon, which looks and feels like black rubber, will wear indefinitely. It is moulded around a metal backing plate which has mounting holes for bolting the electrode to a wand.

Pipe coating materials such as hot bitumens, which clog wire brushes, will not adhere to this silicon due to its inherent non-wetting property. It will function equally well on dry or moisture damp surfaces. Its natural resistance to abrasion gives this electrode far longer life than wire brush electrodes which tend to frazzle and become tangled and matted. The rubber-like flexibility of the silicone material will conform to surface irregularities during the testing process and will readily indicate "holidays" in paint or di-electric coatings on T's, valves, tanks, and structures. Closely approximating the conductivity of wire, this conductive silicon material gives testing efficiency equal to all other types of electrodes in general use.
Tinker & Rasor

Borescope Permits Internal Inspection

356 A new borescope developed by Lenox Instrument Company, permits complete internal inspection of tanks, vessels, combustion chambers and other equipment by means of an adjustable mirror, which can be controlled by a hand-wheel to permit scanning from retrospective through right angle to forward oblique. The larger field of view offered by the new instrument makes it easier to detect any flaws, pits, cracks or deterioration to assure perfection in maintenance. Borescope gives a magnification of 10 power, a field of vision 9 in. in diameter at a distance of 24 in., and has a viewing head with a 13/16-in. diameter 100-w lamp for illumination. Already in use where gas turbines and engines are used for stationary power, new unit promises to be invaluable for satisfying today's increased demands on internal inspection. Modifications of this instrument to meet specific applications can be made.
Lenox Instrument Company

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'Back-Pack' Resuscitator

357 A lightweight life-saving device has been developed that will make it possible for a rescuer to carry on his back to a person who is unconscious or trapped.

New model will cut precious seconds from the time required to administer oxygen to a victim of gas poisoning, suffocation, heart failure, shock, drowning, and many other types of mishaps.

The new resuscitator weighs about 20 lb with its two "D" oxygen cylinders. It is designed so it can be quickly fastened to the back and is held in place by strong elastic bands.

It is equipped with a control which adjusts the flow of oxygen to the lung capacity of any patient, automatically inhaling and exhaling for him until his own breathing is restored. A twist of one dial then converts the unit to an inhalator to provide 100 percent oxygen. It can also be used as an aspirator to suck obstructing material from the throat.

Rescue worker equipped with the 'back pack' can restore the victim's breathing as soon as he reaches him, before attempting to move him or administer other types of first aid. Unit is small enough that rescuer can crawl comfortably and has both hands free for moving debris or giving emergency treatment.

For use in areas of air contamination such as mine or sewer disaster, chemical explosion, smoke or dust, the unit can be equipped with dual oxygen masks — one for the victim, the other for the rescuer. Both give 100 percent oxygen from the back-pack supply tanks so neither person breathes additional quantities of impure air.

Use of strap-on masks makes it possible for the victim to be given oxygen even while he is being carried on a stretcher. In such a case the back pack could be worn by one of the stretcher carriers.

National Cylinder Gas Company

Portable Line Tester

358 A "utility" version of the new Farris "Porta-Tester" weighing only 55 lb and contained within a carrying case, has been developed by the Farris Engineering Corporation for general industrial use in at-the-site hydrostatic testing of valves, pressure vessels, piping, steam generators, pump cases and other process equipment, to pressures up to 3000 psi.

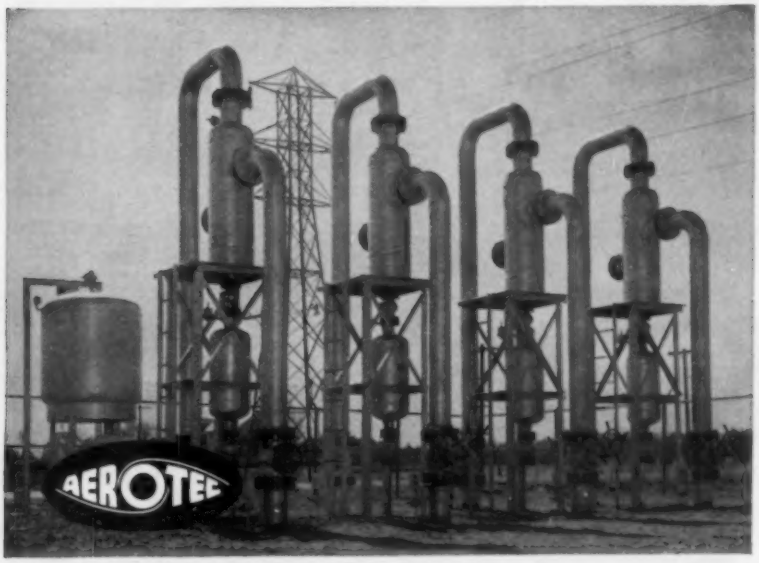
The completely portable unit is only 18 by 14 by 8-in. and can be carried about like an overnight case. It is complete with four test-accuracy gages and 8 ft of hydraulic, flexible tubing that packages on the rear of the cover for complete portability. The pump handle folds flat for easy storage in the case. The unit can be used with water or other hydraulic fluids.

Farris Engineering Corporation

Tractor Is Pipe-Handling Tool

359 "Michigan" Model 75A (8000 lb fitting capacity), manufactured by Clark Equipment Company, is shown working on a city water main job, an operation pointing up advantages of the machine in pipelining. In addition to handling pipe in the field, the "Michigan" lowers it into the trench and backfills the cut. Other vehicles in the "Michigan" line are used in handling sections of concrete pipe weighing 10 tons and more.

Clark Equipment Company



cleaning gas without wetting agents

These four Aerotec Gas Scrubbers, operating in parallel, were installed by a large utility to clean the gas at the entrance to the Albany, New York distributing station.

Dry clean gas is a necessity at this critical point, and these units have been serving the community for several years with no liquid carry-over. They operate on the principle of centrifugally removing solid and liquid contaminants from gas, a method in use for many years in dust control.

Aerotec Dry Gas Scrubbers are serving the industry on practically every major gas line today. Their outstanding performance presents an unexcelled record and their comparatively small size simplifies installation in limited space.

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Manufacturers
THE AEROTEC CORPORATION
Greenwich, Conn.

Books

Lange's Handbook of Chemistry, *compiled by Dr. N. A. Lange, assisted by G. M. Forker. Handbook Publishers, Inc., Sandusky, Ohio. Pages, 1969. Price, $8.50.*

The ninth edition of this standard handbook, designed especially for chemists. Its contents include the elements, physical and chemical properties of inorganic and organic compounds, analytical methods, industrial chemistry, and mathematical data. Many new tables have been published along with revision of earlier tables to make them consistent with latest information.

The Development of Executive Talent, *published by American Management Association, 330 West 42 Street, New York 36, New York. Pages, 576. Price, $7.75.*

This volume is a collection of papers by management people on the most successful and scientific approaches to the problem of developing competent managers for the future and improving present managerial performance. Among the 18 case studies of company experiences several petroleum companies are included.

Petroleum Facts and Figures, *12th Edition 1956, published by American Petroleum Institute, 50 West 50th Street, New York 20, New York. Price, $2.*

Now an even dozen of the basic statistical volumes have been published by API. The first edition was copyrighted in 1926. Publication has not been regular in the 30 years since.

Frank M. Porter, president, API, says in his foreword that the 9th (1950) and 12th editions together provide a statistical history of the oil industry dating from the earliest years.

California Civil Engineer and Engineer in Training Examinations *by August E. Waegemann, 2833 Webster Street, San Francisco 23, California. Price $7. Pages, 381.*

A new enlarged and revised book is now available covering examinations given by the State of California for the registration of civil engineers and engineers in training. Examinations given between 1940 and July of 1949 include the unofficial solution of the problems by the author and the balance of the examinations from July of 1949 to June 1956, include problems only.

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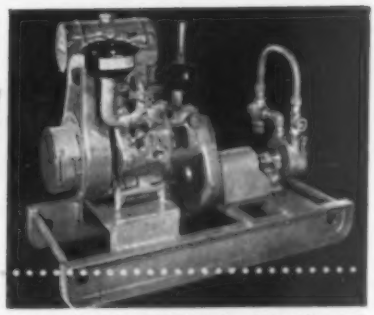

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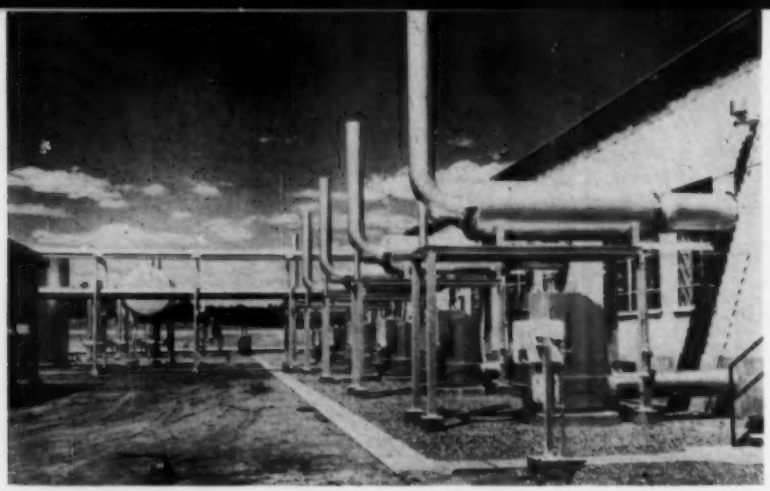

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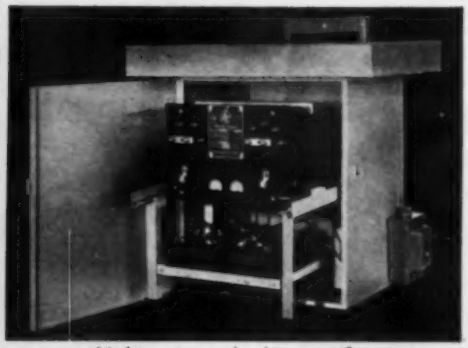
HOLCOMBE SELENIUM RECTIFIERS

Small size steel cabinet rectifier.



Medium size steel cabinet rectifier.

Backed by fourteen years' experience in corrosion prevention, Holcombe rectifiers are soundly designed, ruggedly built, and carry an exceptionally long term warranty. That's why you'll find them all over the country, in use by major oil, pipeline and industrial firms. No matter what your rectifier application may be, there's just the right Holcombe unit to fit the job. Available in all sizes, they are made with cabinets of cadmium plated steel or aluminum. *Write for new literature on Holcombe rectifiers and other corrosion products.*

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CALGARY, ALBERTA, CANADA

Lion Coatings • Holcombe Selenium Rectifiers
Pipe Wrappings • Graphite Anodes • Coke Breeze

Exhaust Snubbers on Pipeline

360 The 13 stations of the Pacific Northwest Pipe Line, running from New Mexico to Washington, are equipped with new turbo-supercharged type engine compressors, the latest in gas engine design. Each of these engines in turn, is equipped with the newest design of Exhaust Snubbers, specifically developed by Burgess-Manning Company for this service and used exclusively for silencing all engines powering this pipeline. The new Burgess-Manning Snubbers are of a straight-through type with an exceptionally low-pressure drop, particularly suitable for silencing the new type turbo-supercharged engine, and very effective in reducing the piercing exhaust noise of these engines. They are typical of the engineering services of Burgess-Manning in the elimination of exhaust and intake noises of internal combustion engines used in many industries.

Burgess-Manning Company

Centralized, Supervisory Control

361 The centralized, economical control of widespread, remote operation as accomplished by the Synchro-Scan Supervisory Control System developed by Builders-Providence, Inc., a division of B-I-F Industries, Inc., is described in a new 12-page color bulletin.

This system remotely controls the operation of any combination of pumps, valves, gates, generators, circuit breakers, and similar devices. By utilizing "plug-in" components throughout the control design, the system can be expanded, through multi-function operation, to meet the requirements of the simplest or the most complex installation.

Bulletin contains numerous halftone illustrations, diagrammatic and wiring drawings, and typical installation photos. It is laid out to show how this supervisory conrtol system is developed from a simple to a more complex form . . . and includes data on the various means of signal transmission possible, standard accessories, and other features contributing to its application versatility.

Builders-Providence, Inc.

New Metal Pretreatment

362 Bindox, a pretreatment coating for metal surfaces, can be used on anything from a delicate wrist watch to a battleship. The basic ingredient for this new product is rice oil, which has amazing penetrating and adhering qualities and contains a nat-

ural wax and other properties highly resistant to corrosive action.

Material has a high flash point (450 F) which makes it particularly adaptable for pretreating hot castings, and after thorough drying the film remains stable up to 600 deg.

Bindox may be applied by brush, spray, roller, or dipping. It is available in three distinct formulations. Superfine Free-X for delicate instruments to be used in the same manner and for the same purposes as penetrating oils. Rapid X3-100 a pretreatment for indoor metals, and as aid in the removal of heavy rust and scale; and Heavy Duty Rust-X for exposed metal surfaces as outdoor machinery and equipment, metal buildings, ship's bulkheads, etc.

Unlike many other pretreatment coatings, Bindox has a very mild, slight paint-like odor, and does not deteriorate in its container.

Guardian Chemical Products, Inc.

Low-Cost Leak Detector

363 A new low-cost leak detector, which detects and locates a leak so small that it will admit less than 2 cu in. of gas per year, is announced by NRC Equipment Corporation. Model 4902 Vacuum Leak Detector is a halogen sensitive instrument offering sensitivity, stability and quick recovery time needed to assure convenient and reliable leak detection. Besides locating leaks in high-vacuum, pressure and other process equipment, this unit is valuable in leak testing hydraulic systems and hermetically sealed components and assemblies.

The new instrument is operated by connecting to the system or part under test which is then evacuated with a mechanical vacuum pump. When a pressure of 80 to 200 microns is attained, the outside of the part is blanketed with a tracer gas. Easily available, low-cost Freon-12 is used. If a leak is indicated, further probing with a fine stream of gas locates the leak with pinpoint accuracy.

Model 4902 incorporates 2 design innovations to overcome the disadvantages of earlier halogen-sensitive leak detectors. The annoyance of the unpredictable slow shift in the "no-leak" signal has been eliminated by measuring the rate of change of the signal rather than its absolute value, so that the unit responds only to the quick change in current caused by the location of a leak. Recovery time from exposure to tracer gas has been sharply decreased by continuously flushing the sensing element with halogen-free air introduced into the element through a controlled leak.

NRC Equipment Corporation

PREVENTIVE MAINTENANCE

With a 16-Year Record!

GIVE PIPE, PIPE JOINTS, FITTINGS and COUPLINGS THE *QUALITY PROTECTION* BUILT INTO

Time-Tested **TAPECOAT®**

To reduce maintenance costs on distribution lines, you need the best possible protection you can get at lowest possible cost. Since 1941, TAPECOAT has led the way in providing dependable, low-cost preventive maintenance on gas lines in underground service.

Today, the performance of this original coal tar coating in handy tape form is more important than ever in your maintenance picture. Equal in effectiveness to mill coating on the pipe, TAPECOAT gives your lines the continuing protection of coal tar. It can be applied *positively* because it has its own perfect bond. No skilled help is required because it is simple to spiral-wrap with the use of a torch. And once TAPECOAT is on, you know from its 16-year record that it will give you uninterrupted protection.

TAPECOAT comes in rolls of 2", 3", 4", 6", 18" and 24" widths. Also available in asphalt. Find out today how it can fit into your preventive maintenance program and help you save time, labor, material and money.

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Center To Search Thermophysical Data

Compelled by curiosity about the world we live in, engineers and scientists are more persistent question-askers than are young children. The entire goal of scientific quest is information. It must be discovered by inspired searching, processed with ingenious manipulation, and finally, recorded and stored in readily-available form. Failure in any of these steps can be fatal to any progress.

Purdue University has established a *Thermophysical Properties Research Center* with two long-range objectives: (1) To serve as a world center for research and for the collection, analysis, correlation and dissemination of data on thermophysical properties; (2) To provide unique facilities and opportunities for graduate study and research on thermophysical properties.

In this project, government agencies and industry are cooperating by providing multiple financial support. Each sponsor contributes approximately the amount of aid he might give an individual graduate student. At the same time, he is participating in and benefiting from a major research program covering a broad field of application. This method of financing enables the University to enter into programs which it might otherwise launch only with great difficulty.

The Thermophysical Properties Research Center was established after a careful two-year study of government, industry and university needs for scientific information in the field of thermophysical properties. The last phase of this study consisted of personal discussions with representatives of several non-profit research foundations, numerous governmental research agencies, a score of industrial organizations, and the committees on thermophysical properties of two national technical societies. As a result of these discussions, several facts were established: (1) Increased research activity of an analytical nature is needed on the thermophysical properties of gases, liquids and solids; (2) The existing mass of widely scattered information is not used effectively because it is not easily procured and assimilated; (3) There often exists wide discord between various original sources of data which can only be resolved by critical analysis; (4) Present technical developments are often limited as a direct result of the paucity of information on the properties of materials, and this situation will continue until a better understanding of the properties of materials is achieved; (5) The most effective and economical way of meeting these present and future needs would be through a systematic program.

The research center is under the immediate direction of Dr. Y. S. Touloukian, professor of mechanical engineering. An advisory committee has been established to serve as a consulting body of experts and to act as a coordinating group for all research conducted at Purdue. Currently, Dr. Touloukian is forming a research staff consisting of trained and experienced personnel in physical chemistry, physics, metallurgy, chemical and mechanical engineering, and library science. By the fall of this year the personnel will consist of 10 full time scientists and engineers. Graduate students doing research in this area will also assist in the program.

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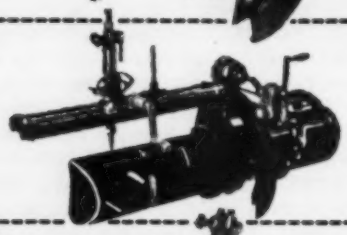
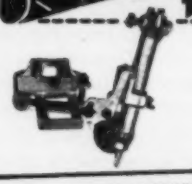
Quick, easy operating. Just slips over pipe, no hinges or latches to open or close. Light weight reduces fatigue factor. Clean, accurate cuts.

Sizes 1 to 5 for Pipe 4" to 36" diameter. No. 5 machine available with optional closed gear section, insertable after pipe machine is slipped over pipe.



SHAPE & COUPON CUTTING

For cutting pipe to weld angular intersections to job requirements. Coupon cutting for welding analysis. Easily operated.



OUT-OF-ROUND ATTACHMENT

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During its first three years the program will be confined to seven essential thermophysical properties: Thermal conductivity; viscosity; specific heat; thermal emissivity, absorptivity and reflectivity; mass diffusivity; thermal diffusivity and Prandtl number. In terms of materials to be studied, the program will concern itself with properties of gases, liquids and solids, starting with the technically important materials and substances. Other criteria for selection of substances and properties to be studied will be: (1) Demand for information on a given property, (2) Paucity or abundance of data, and (3) Degree of discord in presently available data.

The staff literature searchers will catalog world literature in an attempt to locate all information on the seven properties listed above for all substances for which such information has been reported. With this background, the Research Center team will be in a position to undertake the study of any material and property without the necessity of repetitive literature searches.

All information amassed will be entered on IBM punched cards or tape in order to enable rapid scanning of large numbers of entries. Each entry will contain the author's name, title of the reference, source of the reference, the abstract number and source of abstract, and the classification codes for sorting by subject, substance and property.

The program, budgeted at $75,000 annually for its first three years, draws support from a number of cooperating sponsors. Already enrolled as Founders Sponsors are: The American Iron and Steel Institute, AVCO Manufacturing Corp., Babcock and Wilcox Co., Bell Telephone Laboratories, California Research Corporation, Esso Research and Engineering Co., General Electric Company, General Motors Corp., John B. Pierce Foundation, Lockheed Aircraft Corp., Office of Naval Research, Rand Corporation, and Standard Oil of Indiana.

As they become available, tables of recommended "most probable values" of properties determined as a result of research projects will be supplied and specific inquiries for special services and research on thermophysical properties and related areas will be integrated in the program.

A brochure describing the Center's activities in detail is available to organizations interested in thermophysical properties. Inquiries should be addressed to Dr. Y. S. Touloukian, Director of Thermophysical Properties Research Center, School of Mechanical Engineering, Purdue University, Lafayette, Indiana.

Verti-Line® Pumps *are made* "SPLIT-TO-PULL"

An entirely new Verti-Line concept for vertical industrial pumps. The discharge head is "Split-to-Pull" making possible many advantages never before available with this type of pump. Here are just a few:

- May be flanged in line like a valve.
- Remove pump without disturbing piping.
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- "Leakless-Packing."
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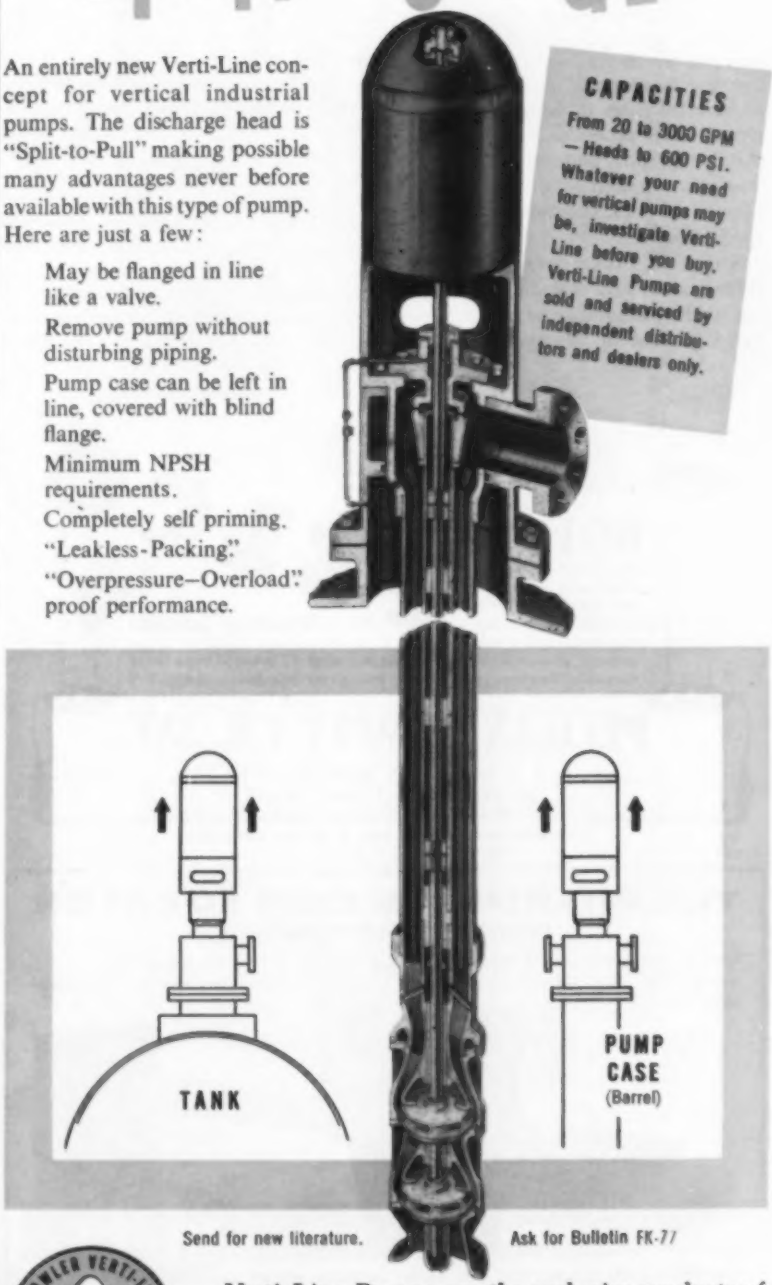

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Sonic Gas Analyzer

364 Data on a gas analyzer employing the velocity of sound and offering exceptional range, sensitivity, and rapidity of analysis, has been released by the National Instrument Laboratories, Inc. The monitoring of gas mixtures by continuous or batch control, the detection of minute amounts of harmful gases in pollution or personnel safety problems, vapor and gas chromatography, and the study of isotope concentration in certain gases are a few of the Sonic Gas Analyzer's many applications.

Sonic Gas Analyzer exploits the wide differences in sonic velocity by achieving such measurable sensitivities as 0.005 percent of oxygen in air and 0.00061 percent of hydrogen. The usual linking of high sensitivity with limited ranges of gas concentration, typical of other types of analyzers, does not exist in the sonic velocity method. The high sensitivity remains the same over the range of 0 to 100 percent.

Instrument contains a long tube in which the velocity of the sound is measured. The gas is fed into the sonic tube at its center and flows out at both ends, so that the velocity of flow does not increase or decrease the rate of sound transmission. Sound waves are generated at one end of the tube and are received by a crystal transducer at the other end. An oscillation frequency of approximately 150 kc per second is used to give high sensitivity. The phase of the received signal is compared with that of the generating crystal and the phase shift is a precise measure of the change in velocity of sound propagation.

National Instrument Laboratories, Inc.

Arc and Torch Welding Wall Charts

365 Two new 2-color wall charts, designed for technical schools and plant training programs in the practical aspects of torch and arc welding are now available from the Eutectic Welding Alloys Corporation.

Each chart, measuring 22 by 34 in., is designed to fit into welding training programs by providing students with graphically clear illustrations of correct arc and torch welding procedures.

The Torch Applications chart (T IS 2690) explains the meaning of low temperature welding, examines the good and bad of common joint designs, and the purposes for which thin flowing and bead forming alloys are designed.

Heating and fluxing procedures, with

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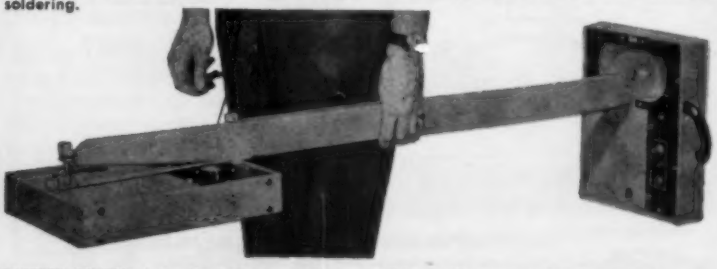
PREVENTS COSTLY DAMAGE
Spots all sub surface pipes, cables, etc., and determines their depth accurately.
ETCHED CIRCUITRY: instead of hand wiring, insures uniformity and freedom from faulty soldering.



BATTERY TESTER: instantly indicates battery condition without removing batteries.
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emphasis on torch distance, angle and motion are also included.

The Metallic Arc Applications chart (T IS 2689) explains the benefits of low heat imput, particularly the avoidance of cracking, hardening and embrittlement in the weld zone.

Simple, easy to understand illustrations demonstate electrode manipulation techniques, pass sequences for "cold welding" cracks, for building up crack sensitive deposits, and for avoiding slag entrapments in fill-ins.

Other special problems considered are joint designs, stress raisers, dissimilar thicknesses, and labor saving metal-working electrodes for chamfering and piercing all metals.

Eutectic Welding Alloys Corporation

Pipeline Valve Booklet

366 Illustrated in color, a new 12-page bulletin describes Grove Series G-4 fabricated steel Seal-O-Ring Pipeline Gate Valves for 6 to 36-in. lines, ASA series 150 to 600, WOG.

Prepared as an engineering and specification reference, the booklet contains complete dimensional tables; charts and graphs to determine venturi valve flow rates and gas flow correction for gravtiy, temperature and super-compressibility; photographs and drawings showing details of design, construction, testing, operational features, and valve types; and material specifications.

Grove Seal-O-Ring Gate Valves are of the round opening through-conduit type, featuring a parallel-sided sliding gate with a combination of metal-to-metal and "O" ring seals on both sides, requiring no lubricant or sealing compounds. G-4 Series utilizes an exclusive fabricated steel body design said to combine high strength with unusually low weight.

Grove Valve and Regulator Company

Printing on Strip Charts

367 A new, 2-color, 4-page folder illustrating and describing Royson identicharts that record on strip charts from a remote point the exact time or sequence conditions occur during process control and test work has recently been issued by Royson Engineering. Folder also illustrates and describes special Royson equipment related to identicharts such as a card printer for a strip mill gage and accessory equipment for integrators. The identicharts models described and illustrated together with a sample of the identifying marks each makes are: Model RI-1 which prints a 6-digit number and that can be adjusted to re-

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FLEXIBLE SHAFT

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H & M offers *complete visibility* in pipe cutting and beveling. H & M's *Flexible Shaft* and the H & M *Motorized Unit* both allow the operator to stand *in front* of the pipe being beveled and observe the bevel through the complete 360 degrees.

The FLEXIBLE SHAFT attaches quickly and easily to any H & M machine, and allows the operator a full view of the circumference of any size pipe, while regulating the speed of the torch.

The MOTORIZED UNIT provides complete automation of pipe cutting and beveling, and is easily and economically attached to any H & M machine. With an easily-regulated, governor-controlled motor, consistently smooth and perfect cuts and bevels are attained . . . AUTOMATICALLY.

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peat the same number or advance one number with each printing; Model RI-2 prints date and time of day to the nearest minute; Model RI-3 prints a number or letter that is remotely selected for identifying range, chart speed, channel number or other variations that need to be keyed; Model RI-4 automatically counts and then at some particular time prints the count on demand.

Identicharts are said to make the job of interpreting charts more accurate after the record has been made. They eliminate the need for someone to watch charts and make identification marks, are accurate and reliable and do not interfere with or obscure the recording procedure. Available in easy-to-install kit form.

Royson Engineering

Catalog on Precision Pressure Meter

368 Fischer & Porter Company has published a catalog on the Press-I-Cell, an instrument for the precise measurement of absolute, gage or differential fluid pressures. The catalog describes the Press-I-Cell as measuring gases or liquids over pressure ranges from 0-4 psi to 0-1000 psi with a degree of accuracy as high as 1 part in 2000. Readability of the scale is of the order of 1 part in 8000.

The pressure-sensing mechanism of the Press-I-Cell consists of capsules or spirals which, when deflected by pressure, set an armature in motion within a set of differential coils. The electrical signal thus produced is sent to a servo motor which drives a 150 to 200-in. film scale to indicate the precise pressure value. Remote transmission is possible by photo pulse, digital, resistance or shaft outputs.

Alarms are available for use with the Press-I-Cell. Explosion proof and portable models can be supplied.

Fischer & Porter Company

Mass Spectrometer Leak Detector

369 Twelve pages explain operating principles and describe diagrammatically 5 methods of leak detection, plus information on specifications, maintenance, and optional equipment (audible alarm, remote indicator, helium concentration indicator, calibrated leak, and sampling probe). Maintenance information includes location and street addresses of the company's Apparatus Service Shops and Apparatus Sales offices. Typical applications covered range from atomic reactor equipment and aircraft gyros to power tubes and semi-conductors.

General Electric Company

Bulletin Tells About Ball Joints

313 How to handle thermal expansion and contraction in piping with Barco Ball Joints is outlined in a new 6-page bulletin just published by Barco Manufacturing Company, maker of flexible ball swing, swivel, revolving, and other types of movable joints.

Illustrations of the 4 basic motion principles of Barco Ball Joints provide the key to the various examples of how to provide safe flexibility in service lines subject to severe contraction and expansion. Actual installations are also shown and explained. Comparison data with other methods of expansion-contraction control is given.

Bulletin also shows how Barco Ball Joints economically solve many other piping flexibility problems encountered in industry of all kinds.

Design engineers as well as operating engineers will find this new bulletin of particular interest.

Barco Manufacturing Company

Why Not Just Tell Them?

245 As an aid to their own technical writers Minneapolis-Honeywell Regulator Company has published a booklet entitled "Why Not Just Tell Them?" which provides many helpful hints in the art of writing. They have now made this booklet available to members of the petroleum industry.

In just 25 short pages, this booklet delivers the keys to good writing and puts this to practical use in down to earth illustrations and examples. Phrased as "the 10 commandments for technical writers" it is an excellent guide to the man in the field as well as a good reminder for those experienced in report writing. In addition, a list of abbreviations and common engineering multiple words are included for bettering handling of Technical Terms.

Minneapolis-Honeywell Regulator Company

Integration of Computer Into Systems

229 A 4-page illustrated report is being issued by Bendix Computer Division describing how a Bendix G-15 General Purpose Computer has been integrated into a customer-engineering-manufacturing system, simplifying the calculations and layout work required in the design.

Greatest immediate benefit is the ability to quickly explore the full range of design possibilities and to materially reduce the engineering hours required to produce a working drawing. Time savings in the approximate ratio of 22 to 1 are obtained.

Bendix Computer Division, Bendix Aviation Corporation

Maintenance Welding

314 "Rexarc keeps earth-moving equipment rolling," is the title of a new 14-page brochure on Rexarc Automatic Welders and Positioners, and components, manufactured by The Sight Feed Generator Company.

Especially designed for earth-moving contractors, and welders alike, the profusely illustrated brochure shows the remarkable versatility of the equipment for handling varied welding requirements by the submerged arc method.

Brochure is believed to be the first in the welding industry to be designed as a combination promotional bulletin and actual sales tool.

New equipment featured includes a roller and idler welder and positioner capable of handling 8 tractor rollers at a time, a rail welder attachment for varied circular and conical weldments, as well as numerous added features on Rexarc welding equipment.

Full descriptive illustrations of the components and distinctive features are beautifully illustrated in 2 colors. Complete charts indicate at a glance the estimated time and material required to build up and hard face a full set of tractor rollers and rails, and also, the pertinent data concerning the welding equipment.

Also presented in the brochure are Automatic Welding Wire, Hard-facing and Manganese Electrodes, Acetylene Generators and Compressing Plants, Liquifluxers and Liquiflux, and replacement parts.

The Sight Feed Generator Company

Pneumatic Control Theory

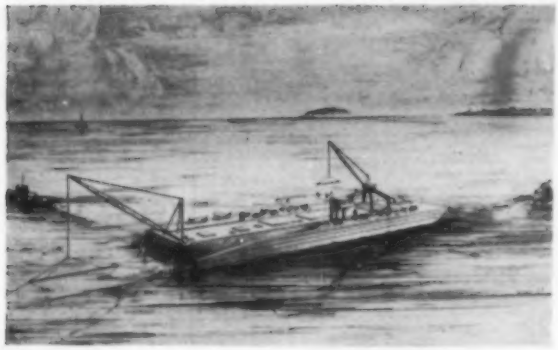
397 A new bulletin on pneumatic control instruments, featuring more than 10 pages of general automatic control theory has been published by The Bristol Company. The 44-page, 2-color bulletin describes in simplified terms and illustrations the basic concepts of narrow band, proportional, reset, derivative, and reset plus derivative control actions. Also covered are selective control, cascade control, and ratio control.

Completing the bulletin are descriptions of the features of the company's line of Series 500 pneumatic recording and indicating controllers. Also included is complete information on sensing elements used with the instruments, for measuring and controlling such variables as temperature, pressure, humidity, flow, density and specific gravity, liquid level, and pH. Final control elements and accessories are listed.

The Bristol Company

Contract let for . . .

Big Offshore Pipe Layer



Contract for construction of a $2,250,000 deep-sea pipe laying barge for offshore work, has been announced by Brown and Root, Inc., Houston, Texas.

The vessel will be 350 ft long, 60 ft wide, and 22.6 ft deep, according to Ed Minor, Brown and Root vice president in charge of pipeline activities.

"A vessel this size will give us the stability required to construct offshore pipelines of any size up to and including 36-in. pipe and continue working even though wind velocity reaches as much as 40 mph," Minor said. "Craft smaller than this are at the mercy of weather while outside and have to stop work when seas kick up."

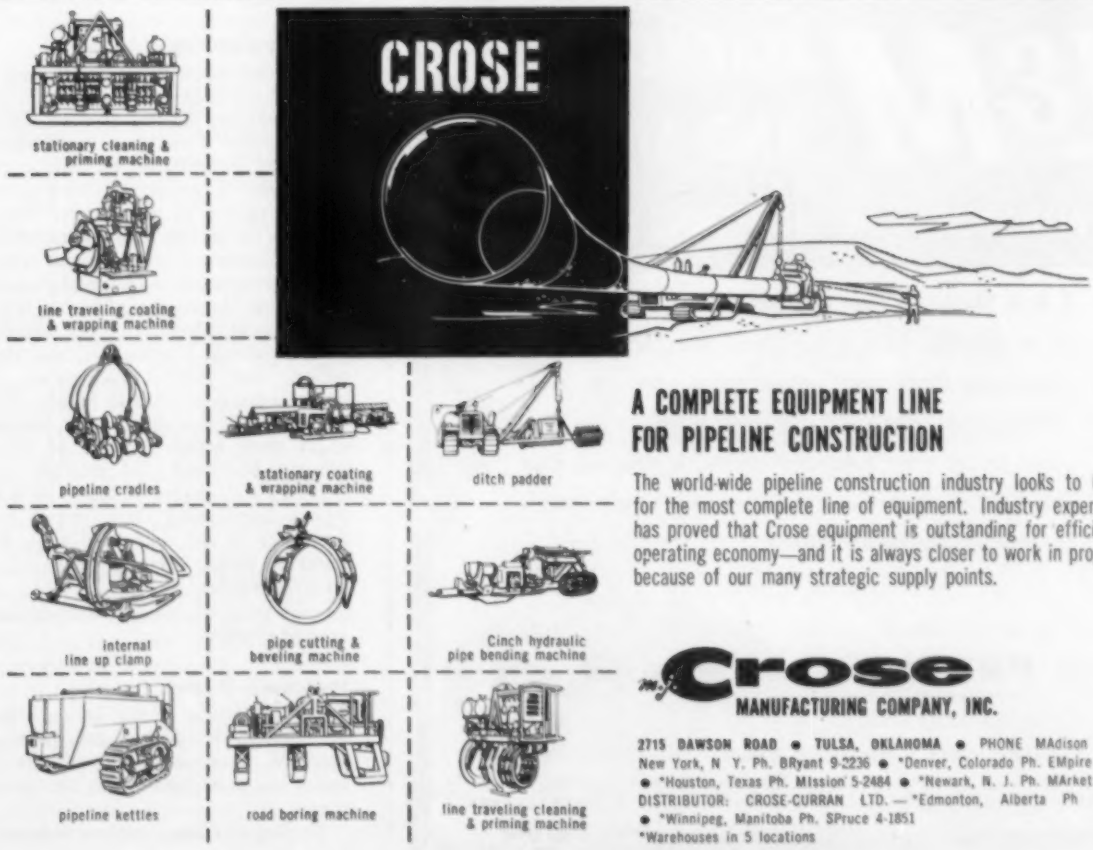
Levingston Ship Building Corporation at Orange, Texas, is already at work on the vessel and delivery is expected by December 1 this year. The vessel was designed by Brown and Root's marine engineers.

Minor said the vessel will be equipped to lay both concrete-coated pipe or pipe coated with the new Timcoat process. She will have unusual versatility in that she can be used not only on pipelines but also for pile driving, setting offshore structures, laying marine cables, and other miscellaneous offshore work.

The vessel will have an 80-ton traveling gantry crane with a 120 ft boom. There will be a central control tower to handle the winches and move the barge through use of its 10,000-lb anchors. Floodlights will allow night operation.

The barge will be a floating hotel with air-conditioned quarters for 88 men. There will be separate quarters for X-ray crew and customers' personnel.

Storage facilities will be provided to carry up to six days supply of pipe on board, further making the operation weather-proof, so to speak, because it can continue working even though smaller supply barges are unable to bring pipe out in the open Gulf.



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Anchors and Anchoring

400 In the 2½ years since its first edition rolled off the presses, more than 100,000 "Anchors and Anchoring" have been distributed free —and the demand constantly increases rather than slackens. Written by R. D. Ogg, president of Danforth Anchors, and R. S. Danforth, founder and inventor, the 16-page, 2-color booklet presents a comprehensive survey of anchor history, testing, problems and recommendations.

The difficult feat of writing for both the layman and the expert has been accomplished in "Anchors and Anchoring." Its style is such that a newcomer to boating can understand it and yet the facts and figures are also presented and verified in such a manner that the most exacting expert is satisfied. Since its first appearance Danforth Anchors has made the book available free of charge to anyone requesting it. U. S. Power Squadrons and U. S. Coast Guard Auxiliaries have been among the most enthusiastic users, often using it as a supplementary text book.

Revisions, incorporating the latest information and data, have been made in each printing and will continue to be made in the future, thus insuring that no portion of the book becomes obsolete.

Danforth Anchors

V-Drive Catalog

227 Production men, design engineers and other users of V-Drives will find the new 46-page Maurey V-Drive Catalog a convenient source of information on fractional horsepower V-Drives and drive parts and accessories. In the range of fractional to 10 hp, this modern, colorful, and well illustrated book presents easy-to-read descriptions and complete size data on the Maurey line of bushed type and fixedbore type cast iron and pressed steel V-pulleys, V-belts, fans and fan pulleys, and V-drive accessories. A special page is devoted to Maurey Interchangeable Bushings. Other special pages show action pictures of both Maurey fractional and multiple V-Drives. Final section of the book is a 9-page Engineering Data Section informative to the user who seeks to select the proper drive for his particular requirements.

Catalog Division, Maurey Manufacturing Corporation

Hydraulic Power

232 A 52-page catalog on hydraulic power units, including pumps, cylinders, pressure switches and accessories, has been published by Oil-Dyne, Inc.

Catalog contains complete technical

data and specifications on 2240 different types and models of Oil-Dyne pumps, single and duplex pressure switches, hydraulic cylinders and a full line of accessories including tube connectors, valves, hydraulic hose and fittings, tubing, and gages.

Specification data charts which can be filled out by prospective users of Oil-Dyne equipment to secure prompt quotation and recommendation for the proper unit for any application are also included in the catalog. Oil-Dyne hydraulic units, designed to develop maximum power output from a unit of maximum size and weight, were introduced less than a year ago. These miniature units, measuring only 8 to 10-in. in height, depending upon motor size, provide finger tip control of ample hydraulic power. Oil-Dyne units are available for pressures to 3000 lb, with peaks up to 5000 lb.

Oil-Dyne, Inc.

New Safety 'Check List'

301 To locate the hidden probabilities of electrically ignited explosions in plants, a "Hazard Finder" is being made available by Crouse Hinds Company.

This 8-page, illustrated folder contains a check list of 13 questions that can help you determine whether uncontrolled flammable gases, vapors, dusts, liquids, and other combustible materials are making your plant unsafe. Part of the folder is sealed until all the questions have been answered. After the seal is broken, an evaluation of the hazard potential in your plant is revealed, based on your answers and the findings of the National Fire Protection Association.

Crouse Hinds Company

Corrosion-Resistant Alloys

249 A new 104-page edition of "Hastelloy Corrosion-Resistant Alloys" is now available. The booklet gives up-to-date information on the 4 nickel-base alloys — Hastelloy alloys B, C, D, and F. Booklet describes chemical compositions, physical, mechanical, and high-temperature properties of the alloys. Also included is a table of the comparative resistance of the Hastelloy alloys to over 250 corrosives commonly handled in the chemical, petroleum, and metalworking industries.

More complete laboratory penetration data are included for some of the common corrosives such as hydrochloric, sulfuric, nitric, phosphoric, acetic, and formic acids. These data are supplemented with graphs showing penetration rates at various acid concentrations and temperatures.

Haynes Stellite Company, Division of Union Carbide Corporation

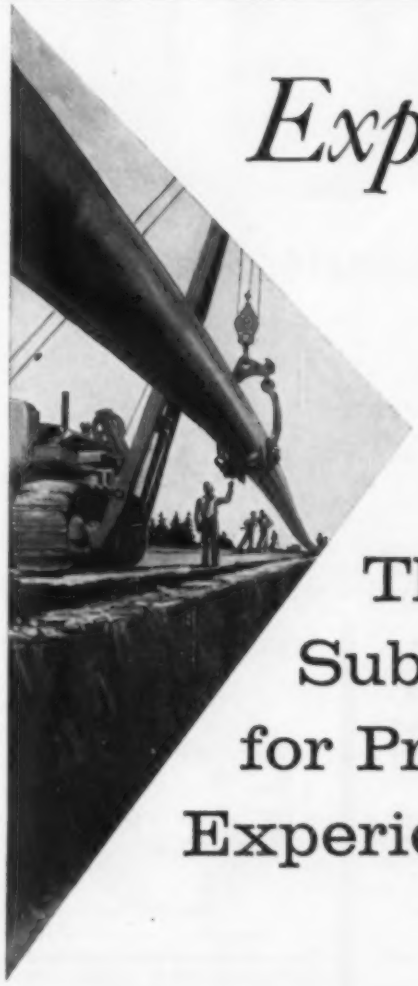
Catalog Featuring Trailers

239 In response to widespread interest for information on the mobile trailer units for industrial needs, the Industrial Division of Spartan Aircraft Company has published a complete catalog on its models.

Including details of famous Spartan construction methods, the brochure also contains floor plans and descriptions of 17 specially-designed layouts that are now assembly-line produced for every type of field housing need. These floor plans were developed from research and analysis of field needs and customer requests. Pictured also are some of the many ways such units are being used by major companies in operations around the world. Spartan industrials, for instance, include units for testing laboratories, offices, display combinations, kitchens, diners, bunk houses, first aid stations, machine shops, laundries, power plants, and a variety of others.

This 20-page, 2-color catalog . . . plus any information desired on special designs to fit particular requirements . . . is free on request.

Spartan Aircraft Company, Industrial Division



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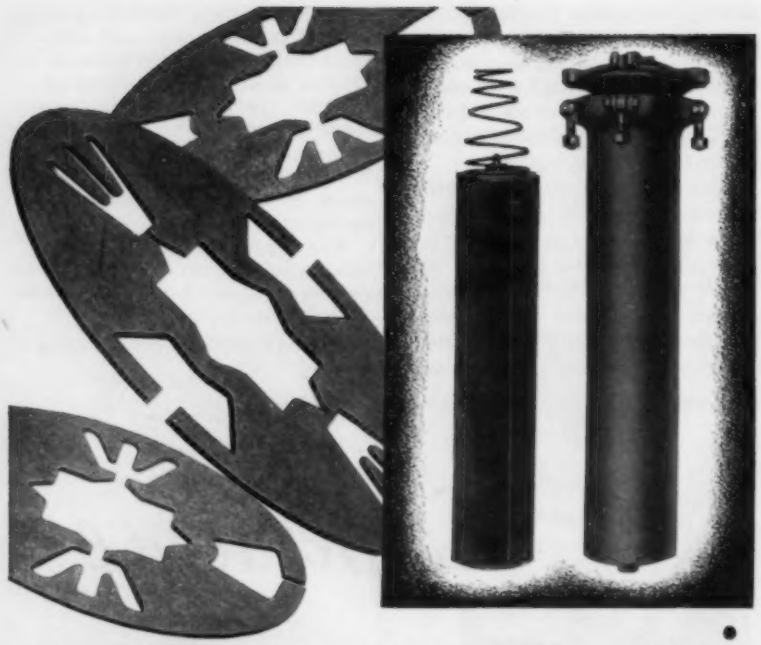


the NUGENT Laminated Disc Filter

This "extended area" filter utilizes an actual filtering surface area greatly in excess of its container area. The Nugent Laminated Disc Filter provides a high flow rate at low pressure drop combined with the extreme fine filtering absorption and neutralizing properties of a depth type filter.

The filter charge consists of a stack of similar crenulated fiber discs, each rotated 45° from the position of the adjacent disc, thus affording proper channeling and maximum filtering capacity. Liquid passes from the exterior to the interior of the filter stack.

The filter recharge has a useful life of from 4 to 10 times that of a cellulose or waste recharge. Changing recharges requires only minutes. Cartridges are interchangeable with all other Nugent bag or depth type cartridges. Write for full details.

DESIGN FEATURES

- Provides "Extended Area" filtering
- Removes solids as small as 2 microns
- Removes acid forming contaminants
- Will not remove additives
- Contains no chemicals or bleaches
- Working pressure 125 psi—tested to 375 psi
- High pressure filters to 600 psi—tested to 3000 psi
- Built in by-pass relief
- Maximum operating temperature 375° F.

HOW IT WORKS

Each disc in filter stack is rotated 45° from position of adjacent disc for proper channeling and maximum filtering capacity.

Established 1897

Wm. W. Nugent & Co., Inc.

3424 Cleveland Street Skokie, Illinois

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Representatives in Boston • Cincinnati • Detroit • Houston • Los Angeles • Minneapolis • New Orleans • New York • Philadelphia • Portland, Oregon • San Francisco • Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

Liquid Lock Washer

240 Technical Report No. 5 gives complete information on how to lock threaded fasteners with Loctite Sealant. Proper selection of grade is outlined in simple terminology so that user can easily obtain predictable results to meet specific locking torque requirements. Specific uses and methods of application are documented for studs, screws, nuts, and other threaded products. Also information on techniques for sealing and soldering sleeve joints.

Fundamental data is given on the basic principles of thread-locking with plastics, as well as formulas for torque determination under varying conditions. Physical properties of the material, both in the liquid and solid state are given, including: Cure time, resistance to solvents and chemicals, heat aging, hot strength, resistance to thermal shock, and electrical properties.

American Sealants Company

Repowering

243 New life for old machines is the subject of a new booklet, "Repowering Made Easy," recently released by Caterpillar Tractor Co.

Many old machines thought to be at life's end because power is down can be made productive again by repowering with a specially designed engine package, according to the booklet. "Repowering Made Easy" describes through illustrations and successful installations how Caterpillar diesel engines help raise production on old machines. Also listed ar- some of the optional equipment and factory service available for repowering.

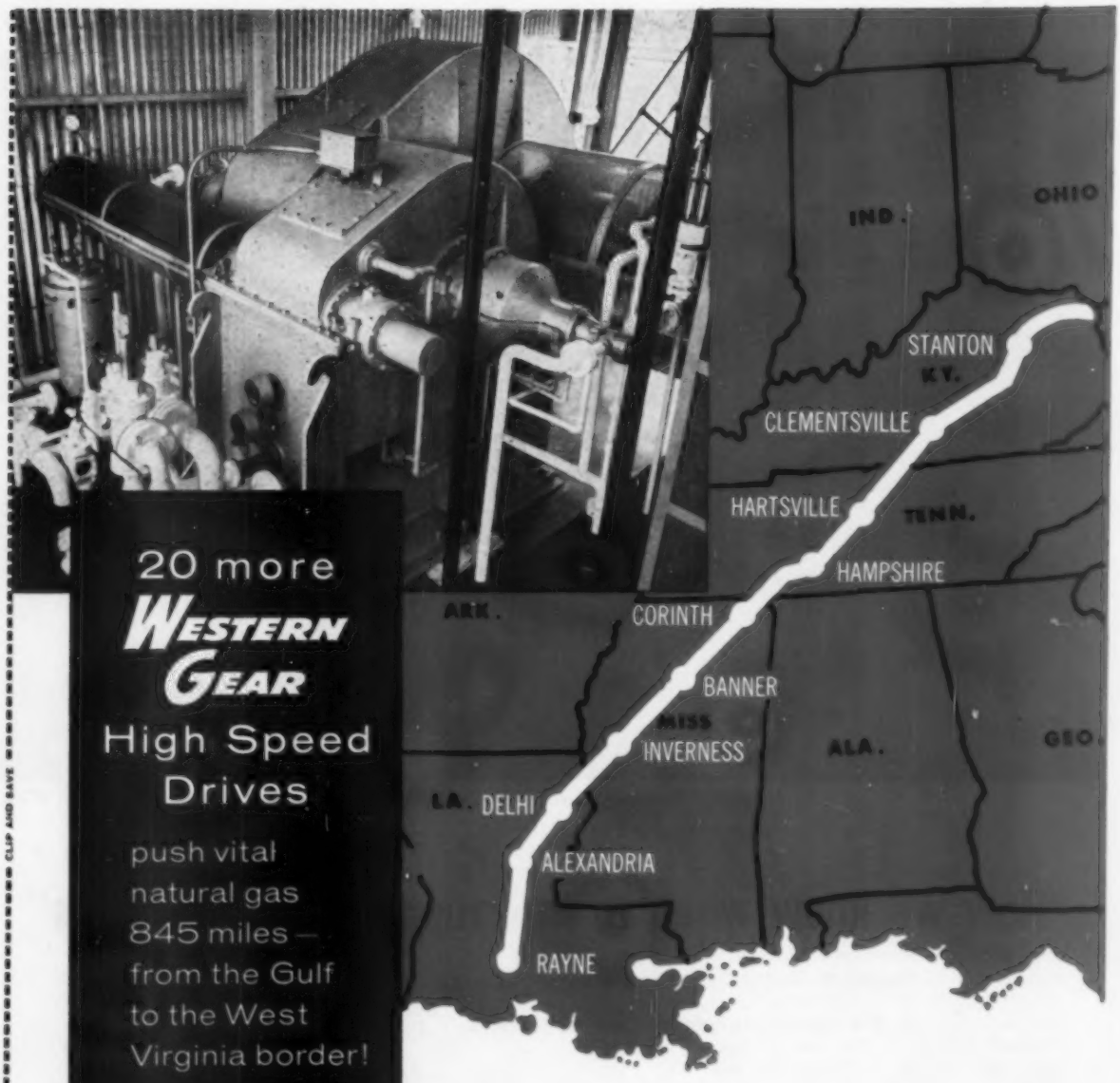
Caterpillar Tractor Company

Technical Bulletin on Oil Coolers

242 Bulletin 12C, "Type 'BB' Oil Coolers," just published by Schutte and Koerting Company, describes a complete line of oil coolers used for cooling fluids in lubricating, power and processing applications.

Both single and 2-pass coolers (conforming to ASME Code requirements for Unfired Pressure Vessels) are described. The bulletin includes data on design and operating features, material specifications, sizes and dimensions, plus a handy siging system. A nonograph for determining logarithmic mean temperature difference, together with simplified design equations, permits rapid approximation of unit for a specific application. A step-by-step example clearly illustrates the procedure.

Schutte and Koerting Company



20 more WESTERN GEAR High Speed Drives

push vital natural gas 845 miles — from the Gulf to the West Virginia border!

Twenty additional two-stage Western Gear high speed units are now being delivered to Gulf-Interstate Gas Company for the expansion of its 845 mile, 30 inch main pipeline to increase its capacity to 575 million cubic feet daily. The outstanding success of its first remote controlled satellite station at Stanton, Ky., has attracted the attention of the industry to this significant Gulf-Interstate development. Western Gear engineers were called upon to design a two-stage high speed gear drive to step up the 5000 H.P. natural gas operated 16 cylinder Cooper-Bessemer engine to power a centrifugal compressor at 6,055 RPM. Western Gear salutes Gulf-Interstate for its achievement and stands ready to assist other forward-looking companies in solving their mechanical drive problems. Experience gained since 1888 assures efficient and reliable performance of Western Gear designed equipment. For assistance write Western Gear Corporation, General Offices, P.O. Box 182, Lynwood, California.

"The difference is reliability" • Since 1888

5762

WESTERN GEAR *Corporation*

ENGINEERS AND MANUFACTURERS

PLANTS AT LYNWOOD, PASADENA, BELMONT, SAN FRANCISCO (CALIF.) SEATTLE AND HOUSTON—REPRESENTATIVES IN PRINCIPAL CITIES

CLIP AND SAVE

CARROLL V. KROEGER, *distribution engineer, Washington National Gas Company, Seattle, Wash.*

"How we know when to interrupt our interruptibles"

Remote metering lines give Washington Natural Gas a 24-hour headstart on determining contract demand

"To stay on the profitable side of our contract, we need continuous readings of flow to determine customer demand—the difference between flow measured at city gates, and supply to our interruptibles," says C. V. Kroeger, Washington Natural Gas.

"Bell System remote metering lines give us these readings. Here in our Seattle office, meter readings from 75 remote points enable us to calculate flow at all gates and project demand over the next 24 hours. Thus we know when to interrupt our interruptibles—or tap our 'peak shaving' reserve.

"Why do we lease lines from the Bell System? For one thing, the service is economical—no capital investment is needed. And telephone men maintain the lines, so we don't have to train new men for our staff. But mainly, Bell service is reliable. We know we can count on it."

• • • •

A Bell System representative will gladly study your communication needs—at no cost, of course—to show how you can get these benefits. Just call your local Bell Telephone Company business office.

BELL TELEPHONE SYSTEM

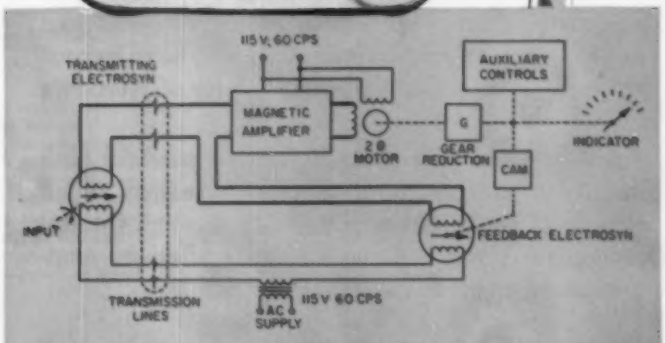
PRIVATE LINE TELEPHONE • PRIVATE LINE TELETYPEWRITER • DATA TRANSMISSION SYSTEMS
CHANNELS FOR: REMOTE METERING AND CONTROL • TELEPHOTOGRAPH • CLOSED CIRCUIT TV

ElectroSyn Pressure Transmitter Model 501

HIGHer reliability
LOWer maintenance

- *pressure*
- *differential pressure*
- *flow*
- *level*
- *temperature*

ELECTROSYN SYSTEM



Basic Null-Balance System for Pressure, Differential Pressure, Level

Basic system consists of signal transmitter, magnetic servo amplifier, null-balance indicator. (No electron tubes or slide wires.)

In measuring pressure the Model 501 transmitter utilizes a twisted bourdon tube as the pressure sensing element. This tube converts the pressure into shaft rotation of the ElectroSyn, a rotary differential transformer. Output from the ElectroSyn is an a-c voltage exactly proportional to the measured pressure.

ElectroSyn is a highly flexible, extremely rugged electro-magnetic system for a wide range of applications in the chemical processing, atomic power, natural gas and petroleum transmission fields. It is designed to measure, indicate, record (including analog to digital conversions), or control pressure, differential pressure, flow, liquid level, temperature.

Leading pipeline companies are using ElectroSyn systems for remote indication and data handling of pressures and flows because of system's reliability, flexibility and the fact that it can withstand a static overload of 300% of rated pressure for a 1% zero shift. For complete information write for Technical Bulletin B257.

NORWOOD CONTROLS
UNIT OF DETROIT CONTROLS CORPORATION
930 Washington Street, Norwood, Mass.

NORWOOD CONTROLS

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"Experience proves we can count on Nordberg Engines for low cost pipeline power for crude, products or natural gas"

These words are representative of the comments made by management and operating personnel of major pipeline companies in reference to the service they get with Nordberg engines for pipeline pumping and compressing service.

Hundreds of pipeline installations have proved that Nordberg Diesel, Duafuel® and Spark-Ignition Gas engines can be counted on to deliver efficient, low cost, long-term power for 'round-the-clock operations . . . on crude, products and natural gas pipelines.

"...and we depend on Nordberg Diesels to keep our tankers on schedule"

In Marine operations, too, Nordberg engines are the logical choice for reliable, low cost power . . . as evidenced by statements made by experienced tanker skippers, and other petroleum transportation personnel who have learned to depend on the "on-schedule" performance of Nordberg Diesels.

These powerful marine engines are widely used for both main propulsion and auxiliary service in tankers of all sizes, from small Great Lakes vessels, up through Coastal and Ocean-going tankers flying the flags of many companies and many nations.

Backed by this broad experience and proved performance, Nordberg engines are your best investment for low cost, long-term power . . . in sizes from 10 to over 12,000 horsepower. We will welcome your inquiry and the opportunity to discuss the application of Nordberg engines with you.

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NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

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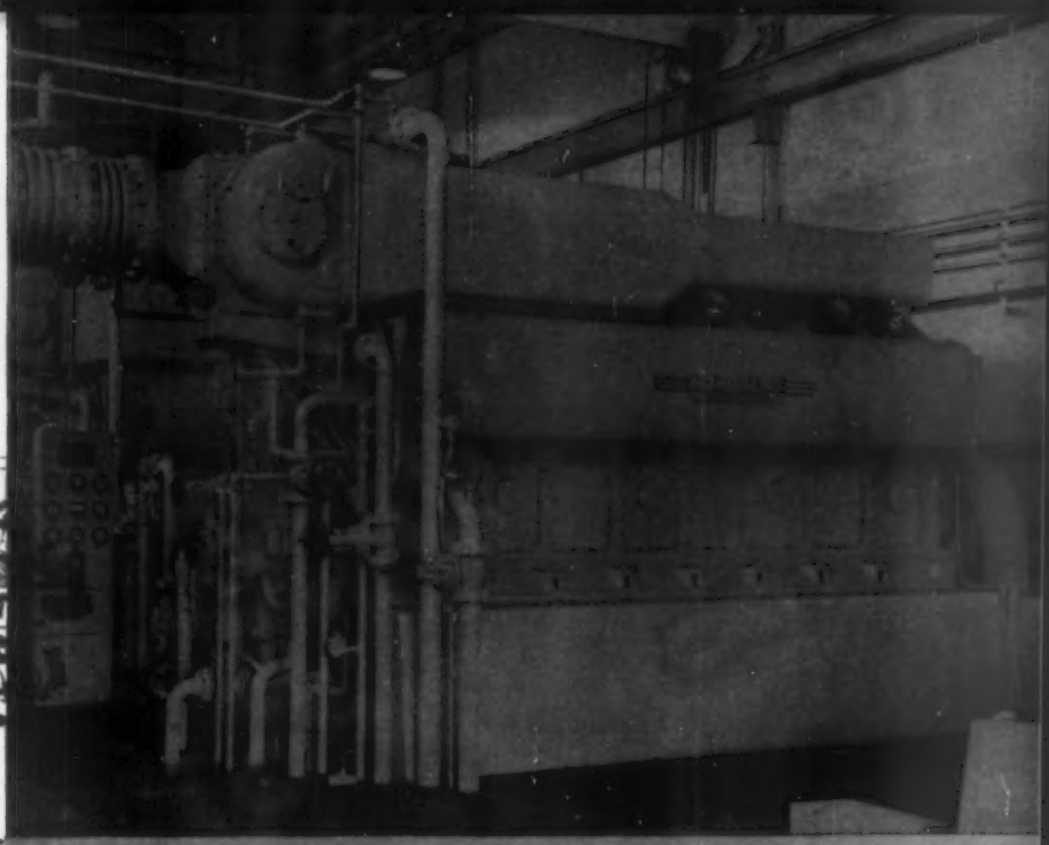
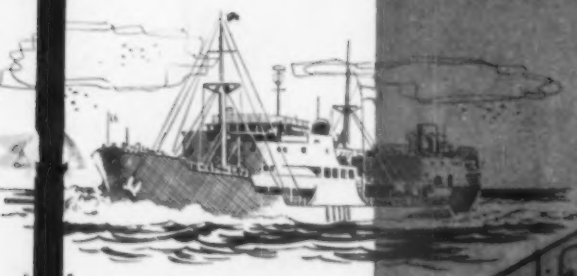
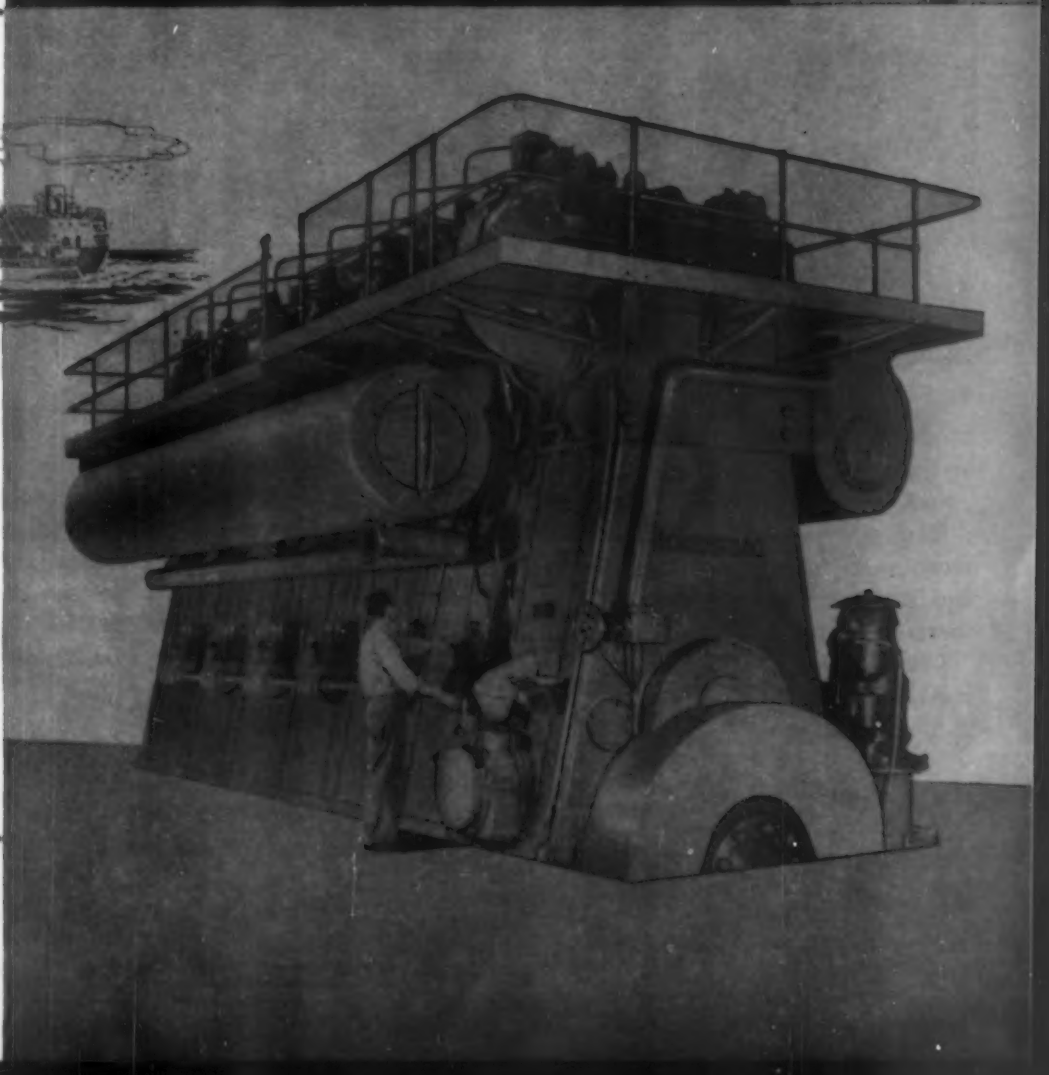
NORDBERG MFG. CO., Milwaukee, Wisconsin



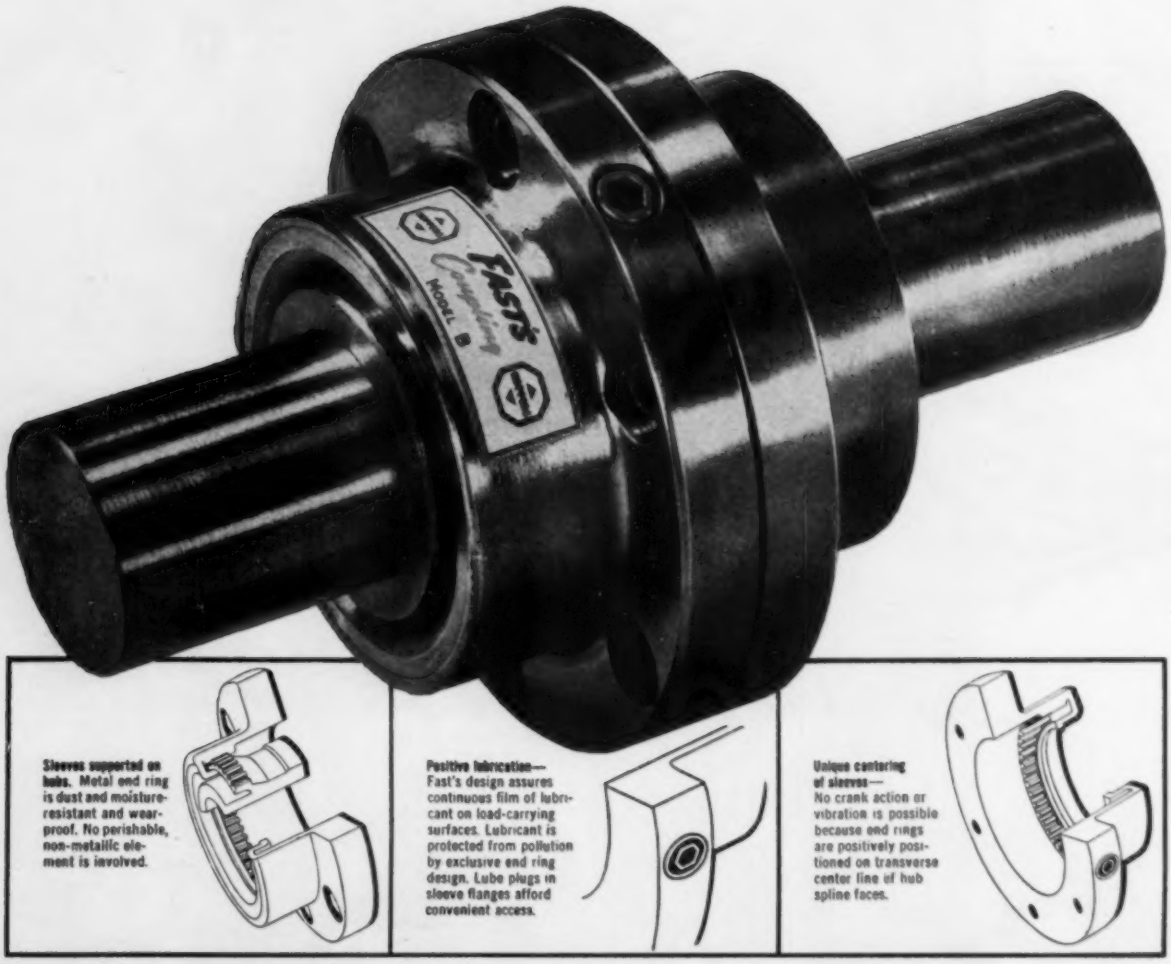
These 2000 hp *Supairthermal*® pipeline engines have been in operation over 20,000 hours with extremely low maintenance. They are part of a total of 24 Nordberg engines to be installed along the Trans Mountain Pipe Line from Edmonton, Alta., to Vancouver, B.C.



M/S *ISLAS MALVINAS*, large Argentine tanker, is one of three sister ships, each powered with 2 Nordberg 4250 hp 2-cycle Diesel main engines, and 4 Nordberg 465 hp 4-cycle Diesel auxiliary engines, for a total of 10,360 Nordberg Horsepower on board.



Builders of America's Largest Line of Heavy Duty Engines


FAST'S
Coupling
MODEL B
Sleeves supported on hubs. Metal end ring is dust and moisture-resistant and wear-proof. No perishable, non-metallic element is involved.
Positive lubrication— Fast's design assures continuous film of lubricant on load-carrying surfaces. Lubricant is protected from pollution by exclusive end ring design. Lube plugs in sleeve flanges afford convenient access.
Unique centering of sleeves— No crank action or vibration is possible because end rings are positively positioned on transverse center line of hub spline faces.

Fast's Model B coupling reduces downtime and upkeep for light-to-medium drives

Mechanical flexibility eliminates costly shutdowns and expensive shaft replacements. But—it's only one of many cost-saving features.

Now you can profit from the durability and economy of famous Fast's couplings in a smaller and lower-cost version—available in 3 sizes for shafts up to 2⅝" in diameter.

The Model B coupling gives you the same features that have made Fast's the world's leading coupling for over 35 years. You get the same trouble-free performance, longer service life and lower maintenance costs. You also get prompt delivery because stocks are on hand to meet practically every need. Free engineering service is also available.

Write today for more details to KOPPERS COMPANY, INC., Fast's Coupling Dept., 3207 Scott Street, Baltimore 3, Md.

Engineered Products
Sold with *Service*

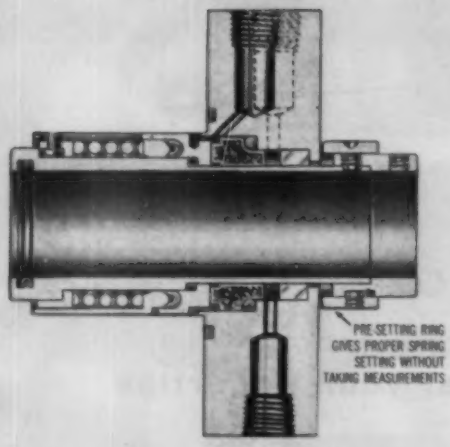
KOPPERS

THE ORIGINAL
FAST'S Couplings

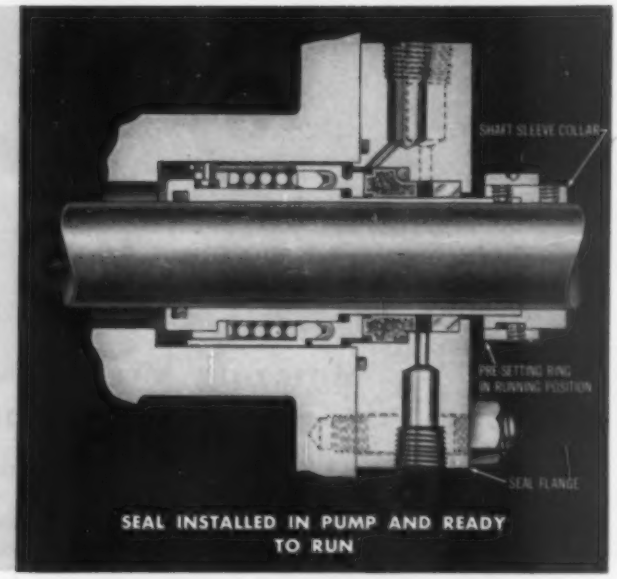
BIG SAVINGS FOR PIPE LINES!

New BJ Mechanical Seal

with automatic Pre-Setting Ring (Patent Pending) assures perfect installation ...without measurement



SEAL ASSEMBLED FOR INSTALLATION AS A CARTRIDGE UNIT



SEAL INSTALLED IN PUMP AND READY TO RUN

Perfect installation of BJ Mechanical Seals is now "built in" by this exclusive BJ Pre-Setting Ring. Anyone with a wrench and a screwdriver now can perfectly install or replace BJ Mechanical Seals. No measurements, no installation drawings, no field fitting required.

This new development provides a seal *assembled as a cartridge unit*—ready for installation. The BJ Pre-Setting Ring is attached to the shaft sleeve collar with a set screw in a slot of controlled length.

You simply slip the "packaged" seal on the shaft and into the stuffingbox... bolt the seal flange to the stuffingbox and the shaft sleeve collar to the shaft... then move the Pre-Setting Ring the length of the set screw slot and lock in place. Your seal is now in precise running position with the spring compressed to its proper tension.

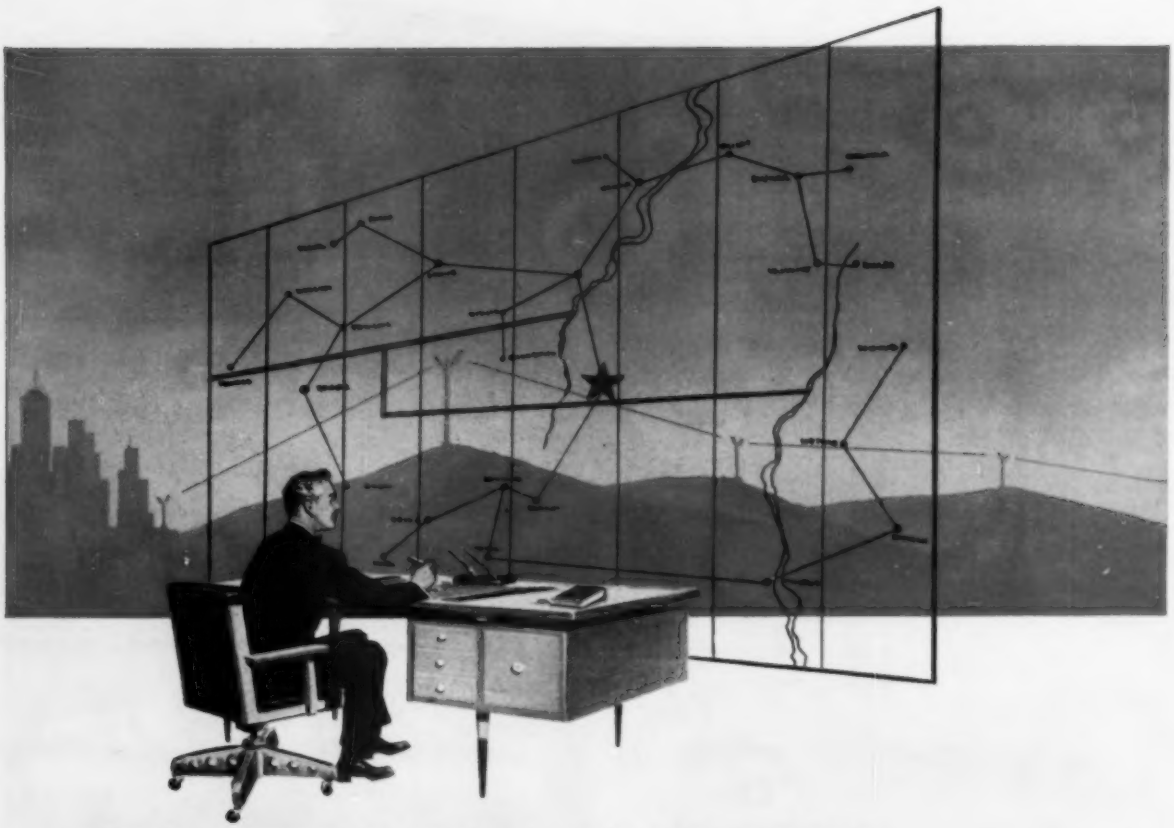
Save time and labor on initial seal installation and on periodic pump inspections. *Specify BJ Mechanical Seals with exclusive Pre-Setting Ring.*

BJ

Byron Jackson Pumps, Inc.

A Subsidiary of Borg-Warner Corporation

P.O. Box 2017A, Terminal Annex, Los Angeles 54, California



TEN MILES OR A THOUSAND . . .

Motorola Microwave puts complete operational control at your fingertips

Cross-country or cross-town—Motorola Microwave can give you centralized control in one *complete*, privately-owned communication system that spans city streets, rivers, and mountains with ease. Multiply your present communication facilities with this work-horse that provides multi-channel facilities for transmitting and receiving orders and instructions by voice, printed messages and control signals. It will speed a thousand tasks a day, working 'round the clock to give you better control, improved coordination and increased efficiency . . . all at a substantial savings in cost.

With Motorola Microwave serving all types of applications (many of them in your industry) you get the benefit of extensive experience. In installation after installation, operational records prove that Motorola Microwave performs better, lasts longer and costs less to maintain.

Learn how Motorola Microwave can give you the *complete* communication system for centralized control. Write, wire, or phone today.

VOICE

Private line and party line—manual and dial telephone circuits—VHF mobile and base station 2-way radio . . . *all* can be carried hundreds of miles, economically and privately, by Motorola Microwave.

PRINTED MESSAGES

Read a message, a chart or facsimile a thousand miles away in seconds. Assemble necessary information the fast, efficient way. Teleprinting, telemetering, telegraph, facsimile are at your command with Microwave.

CONTROL SIGNALS

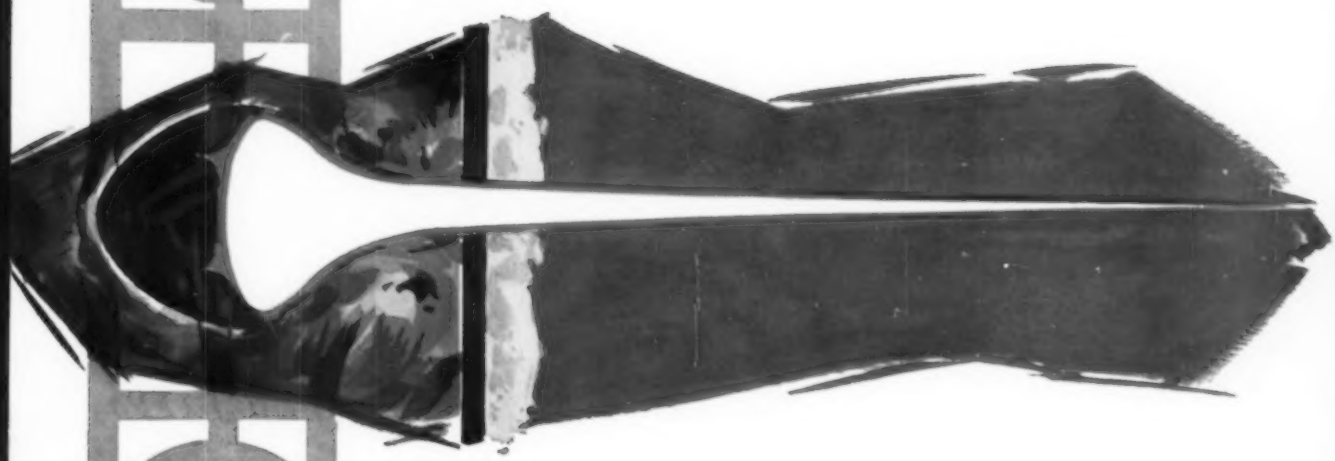
Read meters, turn valves, from *any* central location you want. With Motorola Microwave you can have supervisory control, remote control, and remote indication. Greater efficiency at less cost.

MOTOROLA MICROWAVE

Motorola Communications & Electronics, Inc., 1400 N. Cicero Ave., Chicago 51, Ill., A subsidiary of Motorola, Inc.

Complete Perforating Service

You can get perforating Results... where everything else has failed...



By calling for Lane-Wells Blitz-Gun, the gun for your really tough jobs in dense, tight formations. The Blitz-Gun has a PROVEN RECORD of extra deep penetration — up to 14⅜ inches. This Koneshot Gun blasts deeper to give you bigger, deeper drainage holes for maximum oil flow. Yet with all this power . . . the **Blitz** virtually disappears on firing. Detonation splinters the aluminum carrier and blows the ceramic charge containers to sand-size particles, practically eliminating the debris problem. When you need results where everything else has failed—call for Blitz-Gun.

Blitz-Gun is ONE in the selection of Lane-Wells guns. Call your nearby Lane-Wells man about the COMPLETE perforating service.

Tomorrow's Tools-Today!

LANE-WELLS COMPANY

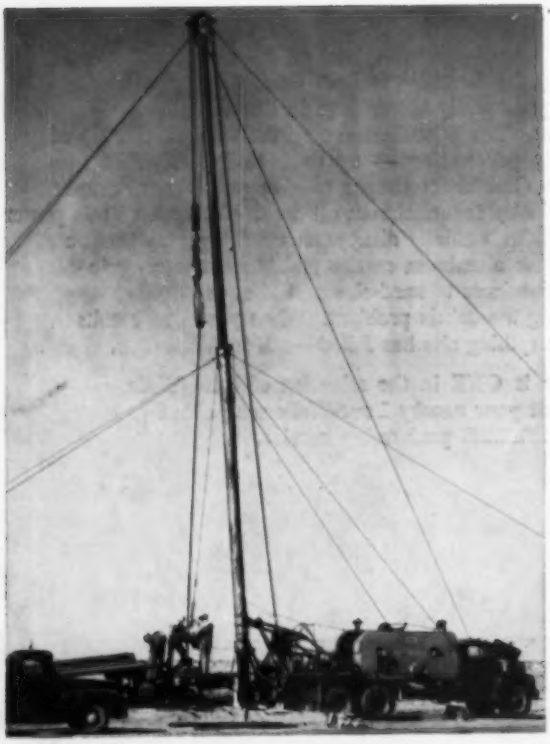
FOR INFORMATION WRITE:
P. O. BOX 1664, HOUSTON 1, TEXAS

LANE-WELLS CANADIAN CO. IN CANADA
PETRO-TECH SERVICE C.A. IN VENEZUELA

Good equipment

MAKES A GOOD CREW

Better



Pulling unit operators and helpers work better with good equipment. They rig up faster. Timing and coordination is better. Jobs get done more efficiently.

Franks CRUISER is a favorite among crews everywhere. Rugged simplicity, convenience and dependability of these pole mast units actually help crews work faster. Efficient, economical results prove the Cruiser's value . . . and reflect the contractor's good judgment.

Get the details from your Franks representative. He's qualified to help you select the Cruiser model most economical for you.

WELL SERVICING AND DRILLING UNITS

FRANKS

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